Rock Products

WITH WHICH IS CONSOLIDATED THE JOURNALS

CEMENT and ENGINEERING NEWS (Est. 1896)

CONCRETE PRODUCTS (Est. 1918)

THE OLDEST PUBLICATION IN ITS FIELD AND THE RECOGNIZED AUTHORITY

THEY STARTED WITH 1 AND NOW HAVE 3 REX MOTO-MIXERS DELIVERING READY-MIXED CONCRETE *in a town of 35,000*

The Three Rex Moto-Mixers of the Certified Concrete Company of Green Bay

Good business always watches for a profitable change. In 1935 the Duck Creek Quarry Company of Green Bay, Wis., didn't wait to see their sand, gravel, stone and cement business begin to fade away. They acted; they organized the Certified Concrete Company of Green Bay; bought one Rex Moto-Mixer and began to deliver ready-mixed concrete.

Today, in this community of 35,000 people, they are operating three Rex Moto-Mixers to supply the increasing demand for ready-mixed concrete. Their experience showed that Rex Moto-Mixers and Agitators actually mix and deliver sand, gravel, stone and cement the easiest and most profitable way.

You, too, can protect your business and get bigger and quicker profits from your sand, gravel, stone and cement by mixing and delivering ready-mixed concrete with Rex Moto-Mixers and Agitators. Investigate this proved path to quick profits; send for the free book, "Rex Moto-Mixers and Agitators." It tells you *how* to do it.

REX
READY-MIXED CONCRETE

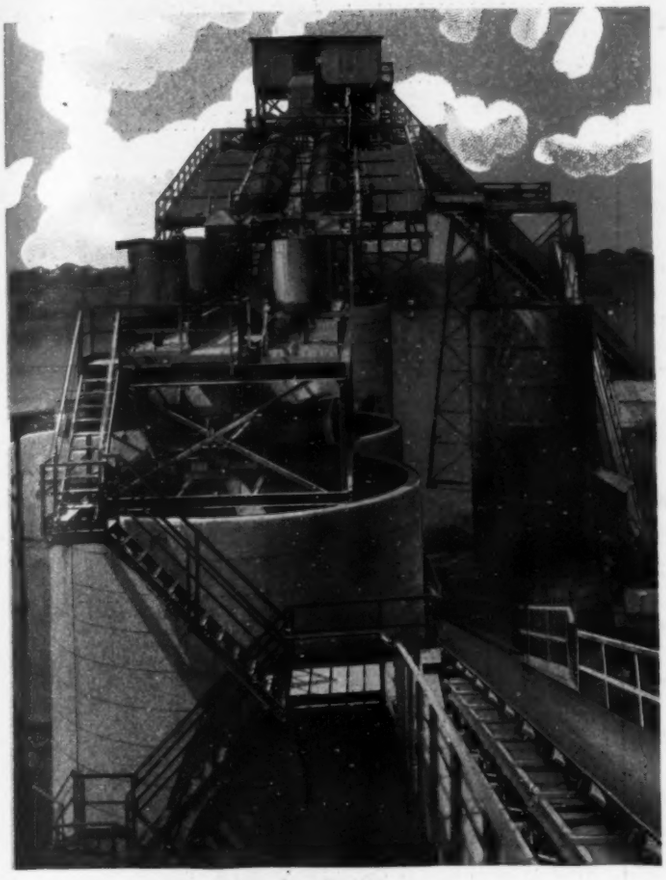
Send today for a copy of the book—"Rex Moto-Mixers and Agitators." It describes the modern way to secure the profitable method of selling cement and aggregates. It illustrates the modern Rex Moto-Mixer features.

CHAIN BELT COMPANY
1649 W. Bruce Street Milwaukee, Wis.

CHAIN BELT COMPANY
OF MILWAUKEE

REX *Moto-Mixers*

During the winter—Plan for the Spring



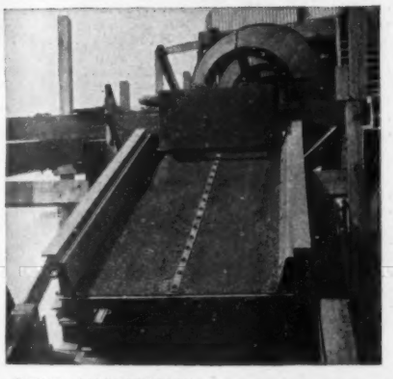
SOME SUGGESTIONS FOR PROFITABLE MODERNIZATION

● Plan for lower operating costs and a better product when your plant opens up next spring, by making replacements and additions to your equipment now.

To take fullest advantage of the greater opportunities which should come from Government and other work, you must be able to meet rigid specifications.

A few suggestions for profitable modernization are illustrated. There are others. Send for Book No. 1240.

Address Link-Belt Company, Chicago, Philadelphia, Indianapolis, Atlanta, San Francisco, Toronto, or any other office located in principal cities.

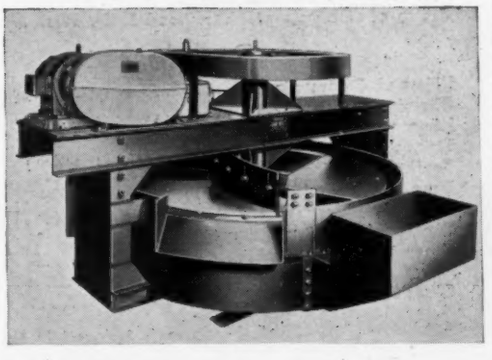


SCREENING

Supplement your rotary screens with Link-Belt vibrating screens to obtain a better grading of the smaller sizes of gravel or stone. Rotary screens for better washing—vibrating screens for better sizing. The combination of both rotary and vibrating screens assures your ability to meet the most rigid specifications.

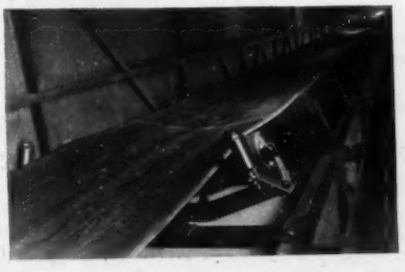
SAND RECOVERY

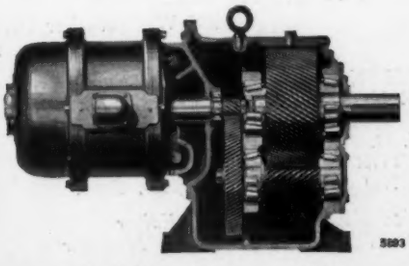
The Rotoscoop is a perfected and dewatering unit which is capable of recovering fine grains and discharging dry enough for truck transportation. Send for Folder No. 1463.



BELT CONVEYORS

Replace your old, plain-bearing belt conveyor idlers with modern Link-Belt anti-friction bearing idlers. Save power, assure dependability and cut down maintenance costs. The conveyor illustrated is equipped with the Link-Belt positive self-aligning idler which automatically and positively maintains the troughed conveyor belt central at all times.





REPLACE OPEN GEAR DRIVES

Greater efficiency as well as safety can be obtained by using Link-Belt speed reducers. The Link-Belt line includes herringbone gear, worm gear and motorized helical gear reducers as well as variable speed transmissions, silent chain and roller chain drives.

LINK-BELT HANDLING AND PREPARATION EQUIPMENT

SEE OUR EXHIBIT AT—NATIONAL SAND AND GRAVEL EXPOSITION—MEMPHIS, DEC. 8-10

Rock Products

With which is Incorporated **CEMENT and ENGINEERING NEWS** Founded 1896

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(Published Monthly)

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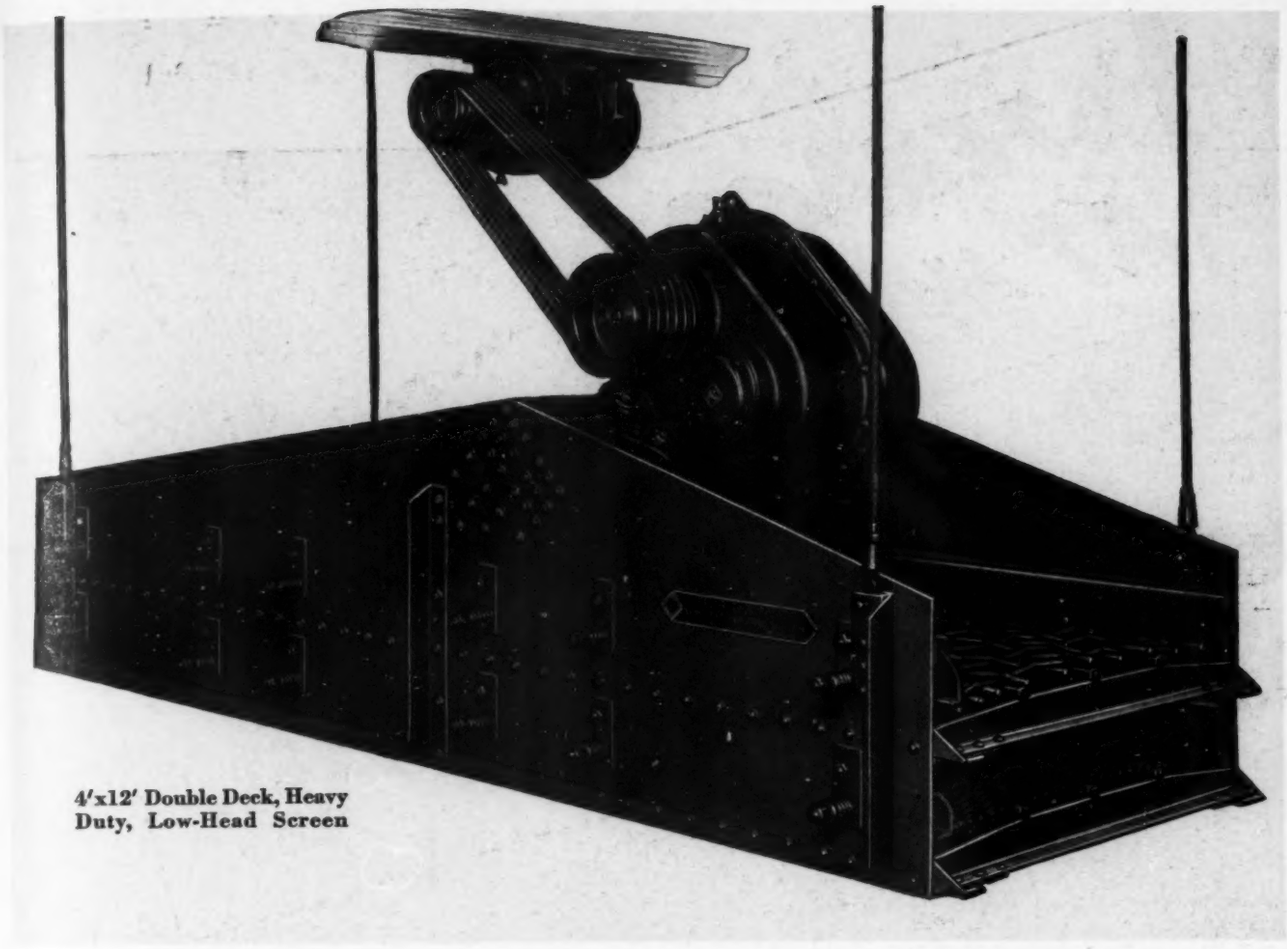

4′x12′ Double Deck, Heavy Duty, Low-Head Screen

Low Headroom - Large Tonnages

Small space and low production . . . they need no longer be linked together, especially in regard to screening operations. The new Low-Head Screen requires a remarkably low head room but at the same time is capable of high production. It eliminates expensive changes in plant layout and construction and at the same time gives you the needed extra capacity.

Like other Allis-Chalmers vibrating screens, the Style B Centrifugal and the Aero-Vibe, the Low-Head is cable and spring suspended; is mechanically strong; and has high screening efficiency, with low power consumption. They are built in sizes ranging from 3′x6′ to 6′x14′ with single, double or triple decks. Write for Bulletin 1478.

A-C ENGINEERED

Blowers, Compressors, Vacuum Pumps.
Cement Making Machinery, Rock Crushers, Screens, Roadbuilding Equipment.
Centrifugal Pumps.
Electric Generators, Transformers, Converters, Rectifiers, Switchgear and Regulators.
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Farm Machinery, Road Machinery, Farm and Industrial Tractors.

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A-C ENGINEERED

Flour, Feed and Flaking Mill Machinery.
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Sawmill and Timber Preserving Machinery.
Steam Turbines, Steam Engines and Condensers.
Texrope Drives.
Water Wheels and Accessories.

Bulletins for various types of equipment furnished on request. Address Allis-Chalmers Mfg. Company, Milwaukee, Wisconsin

IN ALL HEAVY-DUTY SERVICE . . . you'll find Texaco Lubricants holding maintenance costs down.

Makers of quarrying equipment and operating engineers in every phase of the industry endorse the economy of these products.

Take, for example, the way that Texaco Crater has lengthened the life of gear teeth. It stops undue wear.

Crater cushions the shock, clings even under high speeds, extreme temperatures, water, and weather.

On wire rope, Crater penetrates to the very core—preserves against rot, rust, corrosion. It coats each individual wire in a tough, viscous film that clings even under high speeds.

FOR SLUSHING machinery that is to be laid up for the winter, the use of Texaco Crater assures you that dampness, snow, rain, rust, and corrosion will not attack the metal underneath.

A Texaco representative will be glad to provide practical engineering service to prove the economies of Texaco Products.

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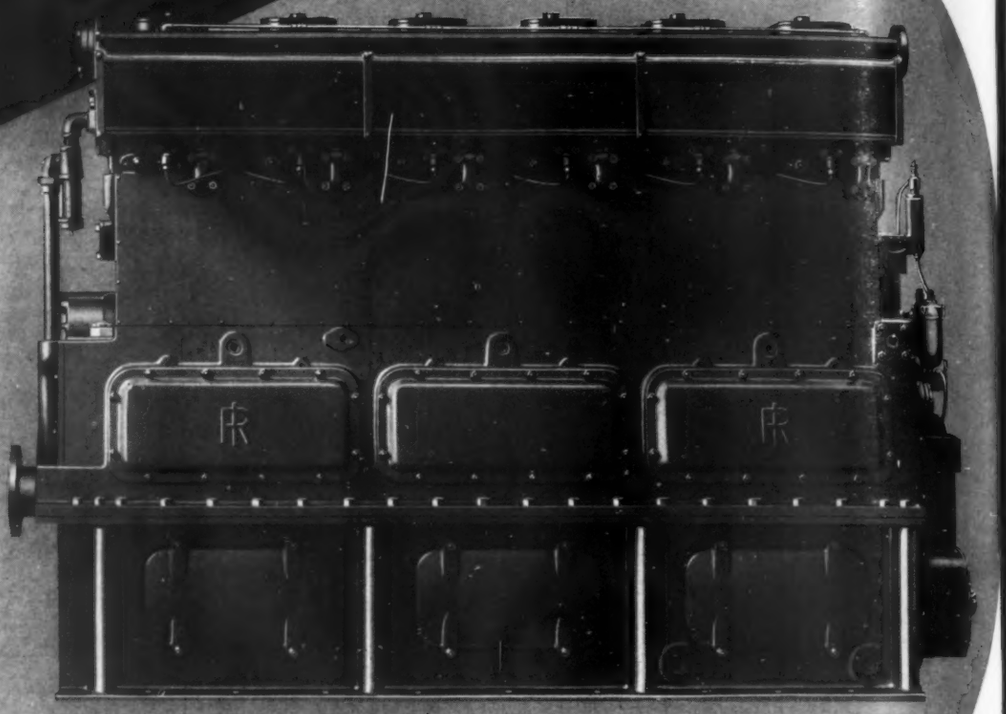
Nation-wide distribution facilities assure prompt delivery

IT'S YOURS—FREE... 32 pages of information for operators of gears, chains, and wire ropes.

TEXACO *Industrial Lubricants*

The MODERN DIESEL

Type "S"



A few of the many advantages of Type S Diesels:

✓ 1. MODERN DESIGN

2. LOWER FUEL CONSUMPTION

3. LOWER INSTALLATION COSTS

4. MORE EFFICIENT POWER TRANSMISSION

5. INEXPENSIVE TO MAINTAIN

6. A THOROUGHLY PROVED ENGINE

MODERN DESIGN

- FULLY ENCLOSED MODERN DESIGN
- WELL BALANCED CONSTRUCTION
- EASILY ACCESSIBLE WORKING PARTS

THE Ingersoll-Rand Type S Diesel engine is an improved unit which is thoroughly modern in all respects. The fundamental design is similar to that of the successful I-R locomotive engine of which there are more than 140 in operation. Some of these have been in service for over 12 years.

The new Type S is the culmination of a vast amount of research and experience gained during 16 years of building outstanding solid-injection Diesels. Some of the modern features of its design are: full enclosure of the engine, cylinder liners, balanced construction throughout, lower weight, and high-speed performance without sacrifice of long life and reliability.

Type S engines are made with 3, 4, 5, 6 and 8 cylinders for ratings from 150 to 460 hp. Get in touch with our nearest branch office today and ask to have one of our engineers tell you more about this engine. Write for Bulletin 10010.

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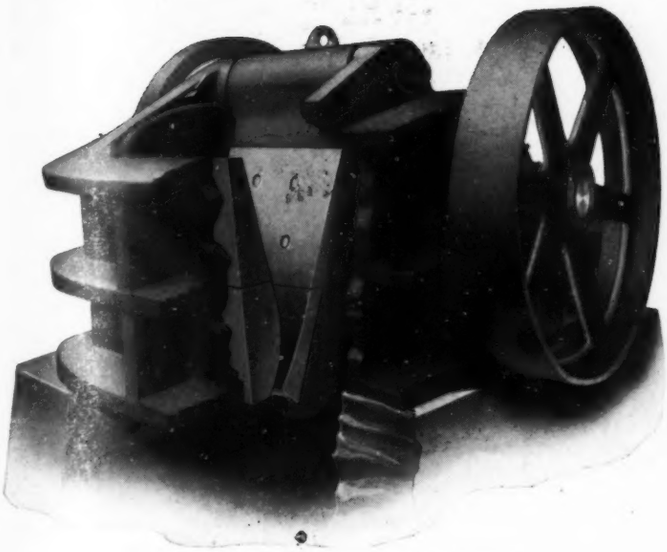
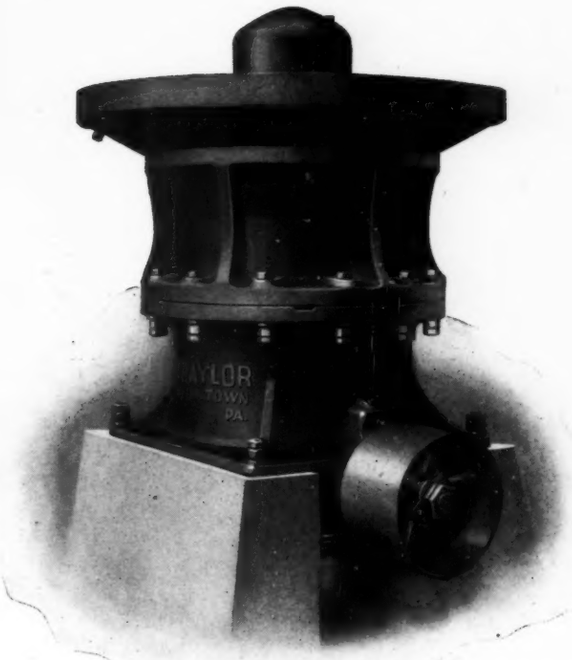
TWO TRAYLOR TRIUMPHS!



TRAYLOR TYPE H BLAKE JAW CRUSHER



TRAYLOR TYPE TY REDUCTION CRUSHER

WE BUILD

Rotary Kilns
Rotary Coolers
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Scrubbers
Evaporators
Jaw Crushers
Gyratory Crushers
Reduction Crushers
Crushing Rolls
Grinding Mills
Ball Mills
Rod Mills
Tube Mills
Pug Mills
Wash Mills
Feeders
Rotary Screens
Elevators

Welded or Riveted Stacks, Tanks and Bins for any purpose.

The TY machine is fitted with Traylor Original, Patented, Non-Chokable Bell Head and Curved Concaves. In the Type H Crusher the same principle is applied to the jaw plates. That's important—because in no other machines than Traylors may these advantages be secured.

We'd need this whole page in solid printing to tell you why these machines excel and how users are voluntarily writing us every day to testify to their pride and satisfaction of ownership of Traylor TY's and H's.

Let it suffice, then, that the universal verdict is that these machines deliver small product of any stone—hardest, softest or anything between—at unheard of low unit cost. As for the inherent advantages of the design of these crushers—suppose you send for our bulletins 105 (H) and 112 (TY) wherein the matter is set out in full. If you'd rather, of course, we'll send you our expert, who'll hand you the bulletins and tell you all you want to know. Right now is the best time to write!

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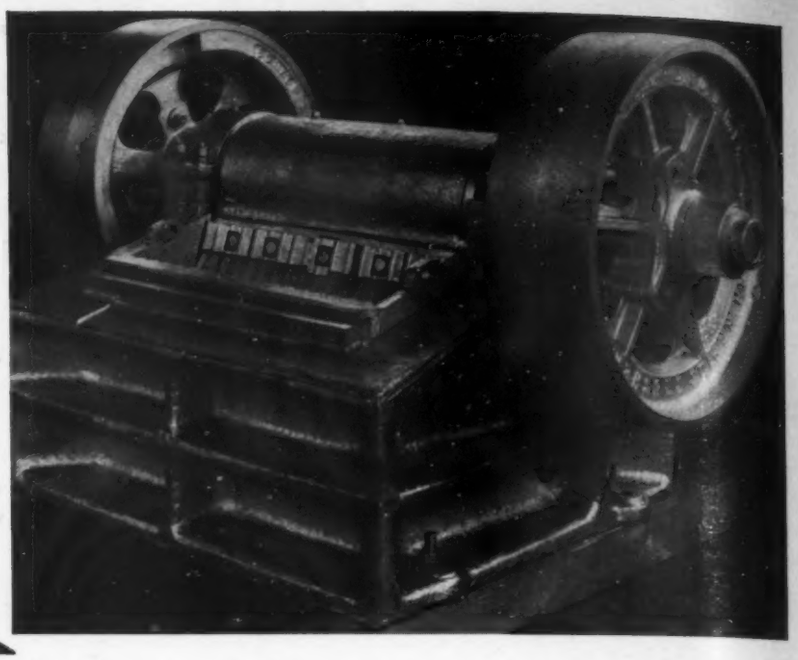

SKF *have proved their ability to take punishment*
ON JAW CRUSHERS

Rock crushing is a job on which SKF Spherical Roller Bearings have been working for years—a job on which their ruggedness, stamina and dependability have been proved.

So when Iowa designed and built this "Cedar Rapids" Jaw Crusher, they selected SKF for main and pitman locations.

As a result, SKF Bearings increase production. They keep crusher costs down to rock-bottom without the slightest trouble. You can depend upon them . . . always.

SKF INDUSTRIES, INC., FRONT ST. & ERIE AVE., PHILA., PA.

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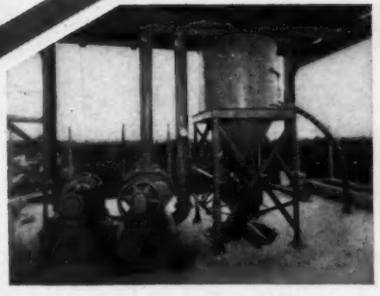
SKF
BALL & ROLLER BEARINGS

FOR CONVEYING AND FEEDING

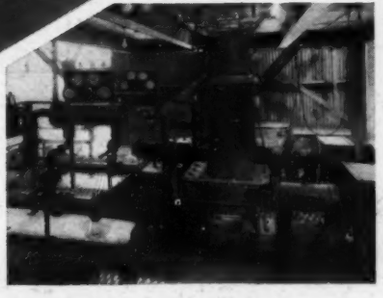
FINE—
CRUSHED—
GRANULAR—
PULVERIZED—
MATERIALS

FULLER

Fuller Rotary Feeder — For feeding granular or pulverized materials. Consistent, volumetric accuracy. Eliminates flooding. No metal-to-metal contacts of working parts. Availabe in all sizes.



The Airveyor — A pneumatic conveyor for fine, crushed, and granular materials. Built in two types: one for materials having relatively little dust, and the other for dusty materials. Manufactured in both stationary, and portable or traveling types.



Fuller-Kinyon Stationary Pump — Conveys through pipe lines substantially all dry pulverized materials at the lowest cost per ton. Capacities range from 1 to 300 tons per hour. Present single systems are conveying as far as 3600 feet and to elevations of 300 feet.

Fuller-Kinyon Portable Pump — For unloading dry pulverized materials from box cars, ships, barges, and bins. Very often appreciable sums can be saved by layouts of processing machinery taking advantage of the possibilities of conveying materials through pipe lines.

FULLER COMPANY

CATASAUQUA, PENNSYLVANIA

Chicago: 1118 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

G-3

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · AUTOMATIC BATCH WEIGHERS · · · BIN SIGNALS

The "R" of a belt is the ratio between tensions on the tight or "pulling" side and slack or "returning" side necessary to maintain the effective tension required to operate the drive—and depends upon the coefficient of friction between belt and pulley. For example, an ordinary belt with an "R" of 2 must be operated at 200 lbs. tight side tension and 100 lbs. slack side, or a total of 300 lbs., to deliver 100 lbs. effective tension. The new Goodyear 5-R Belt is so named because its higher coefficient of friction gives it a minimum "R" of 5. To maintain an effective tension of 100 lbs., it requires a tight side tension of only 125 lbs. and 25 lbs. slack side, or 150 lbs. total—reducing bearing pressure and insuring longer belt-life.

Pulls heaviest loads at 25% to 50% lower tension without slip!

AFTER years of research Goodyear engineers present a revolutionary development in flat transmission belting—a square-edge fabric belt with a *permanent minimum ratio of tension*, or "R," of 5. Hence its name—the Goodyear 5-R.

What that means in terms of belt efficiency non-engineers will find explained in the adjoining diagram. Briefly, it handles any given load at 25% to 50% lower tension without slip and far less stretch!

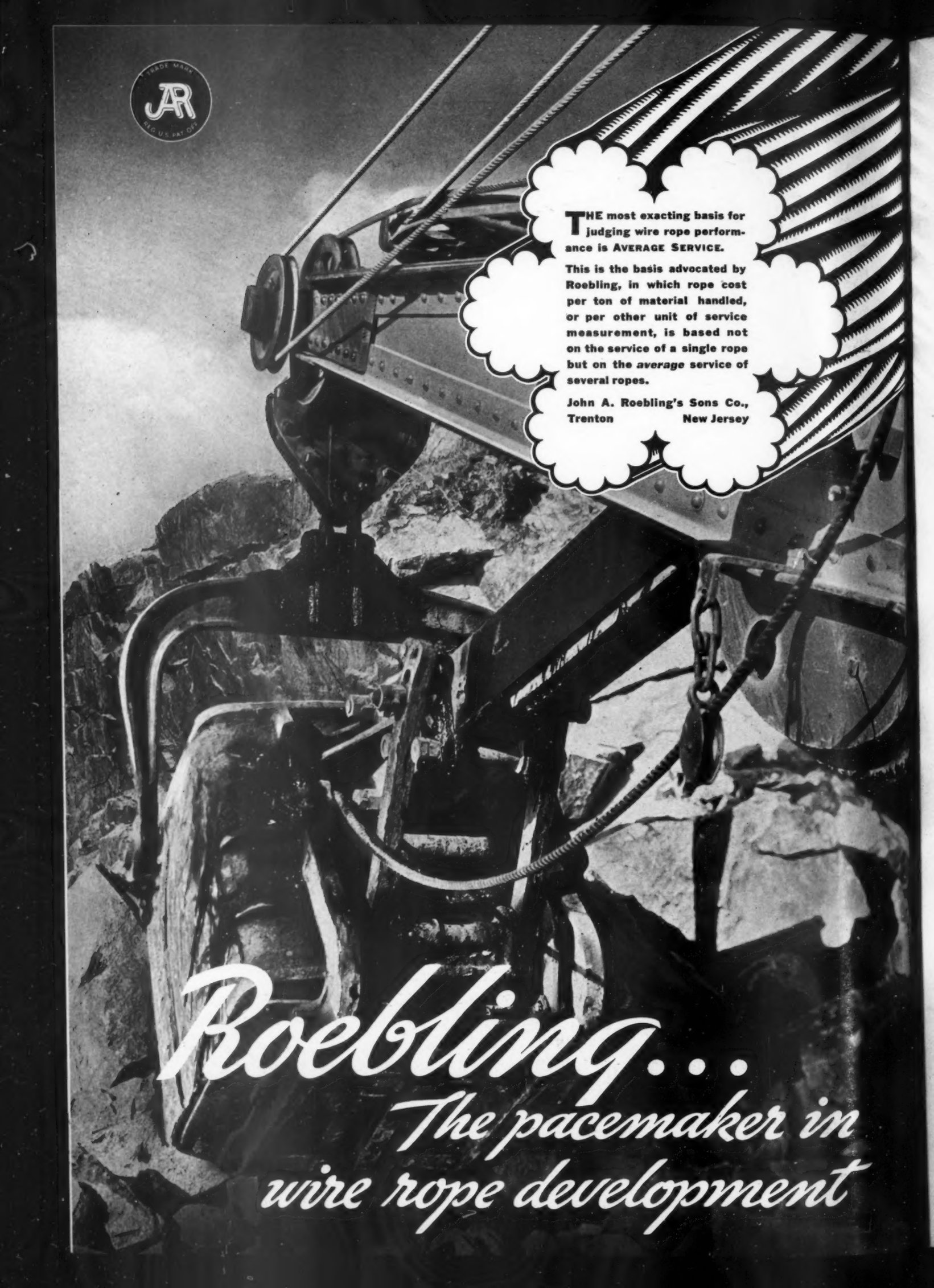
Highest coefficient of friction

The secret of the 5-R's amazing slack-tension operation is a new Goodyear-perfected non-rosinous rubber compound impregnated through the fabric which gives it a coefficient of friction—a pulley grip—*unexcelled in any other type of belt!* As the surface wears, new friction is exposed with all the grip of a new belt—a surface that will not chatter or ball-up.

Months of service in typical operations have conclusively demonstrated 5-R's ability to reduce power transmission costs. Armored with a permanent, high coefficient of friction 5-R attacks cost on two fronts. **1.** *Lower tensions* in the belt itself, resulting in longer belt life and greater ability to hold fasteners. **2.** *Reduced bearing pressure*, resulting in longer bearing life, less lubrication problems, less frictional losses. It is now available in roll lots in all popular sizes and widths. The G. T. M.—Goodyear Technical Man—will be glad to give you full data on this unique new belt. To bring him to your plant, write Goodyear, Akron, Ohio, or Los Angeles, California—or the nearest Goodyear Mechanical Rubber Goods Distributor.

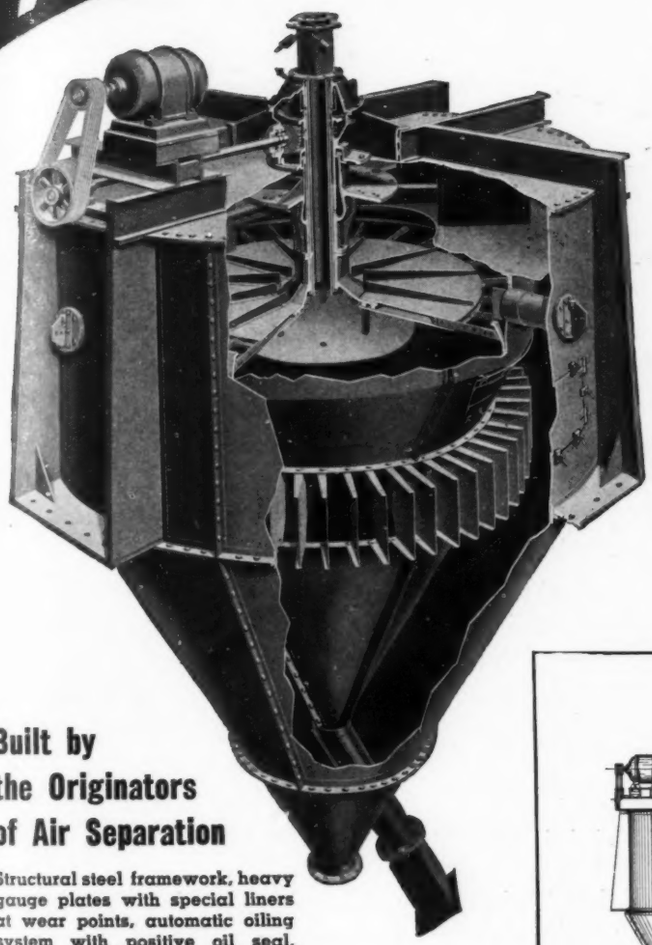
THE GREATEST NAME IN RUBBER

GOODYEAR


TRADE MARK
JAR
REG. U.S. PAT. OFF.
THE most exacting basis for judging wire rope performance is AVERAGE SERVICE.
This is the basis advocated by Roebling, in which rope cost per ton of material handled, or per other unit of service measurement, is based not on the service of a single rope but on the *average* service of several ropes.
John A. Roebling's Sons Co.,
Trenton New Jersey
Roebling...
The pacemaker in
wire rope development

WHIZZER SEPARATORS

for Improving Cement Quality Increasing Mill Capacity Reducing Production Costs



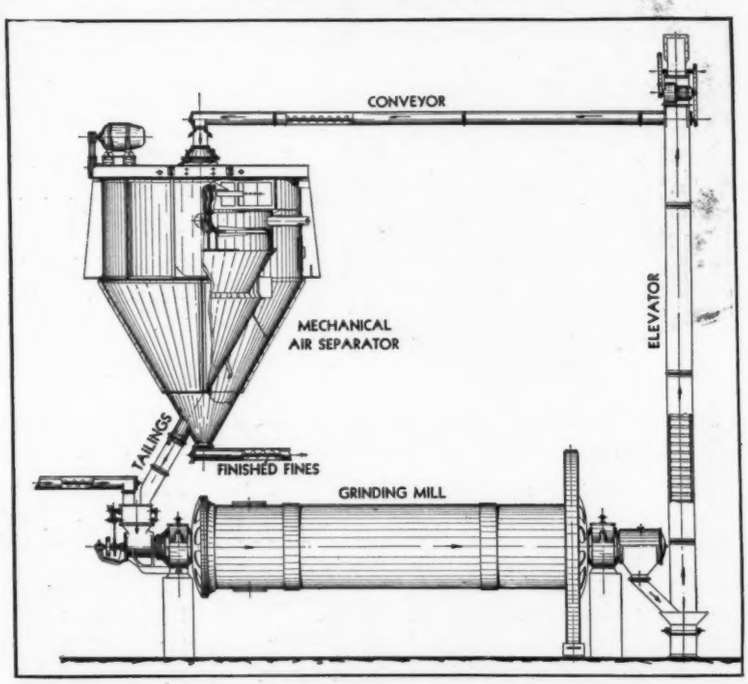
THE effective *whizzer action* in the Raymond Mechanical Air Separator produces outstanding results on cement, as shown by recent reports from leading manufacturers. Where Raymond Separators are used for closed circuit grinding, the resultant gains over the former open circuit methods more than justify the installation by paying a big return on the investment.

In a plant making standard cement, a Raymond Separator operating with two com-peb mills has increased capacity by 32.6% and brought the specific surface area from 1500 to 1900. Another Raymond unit with six tube mills reduced power costs by 14% while boosting output 50%. For producing high early strength cement, the Whizzer Separator is setting a new standard of quality by insuring uniform particle sizes, high flour content, and exceptional strength tests.

Write for details of this advanced design of separator — it offers more profitable production for 1937

Built by the Originators of Air Separation

Structural steel framework, heavy gauge plates with special liners at wear points, automatic oiling system with positive oil seal, easy adjustment for fineness with vertical slides that do not restrict air flow.



Typical arrangement of Raymond Mechanical Air Separator with tube mill or ball mill for closed circuit grinding.

RAYMOND BROS. IMPACT PULVERIZER CO.

DIVISION OF COMBUSTION ENGINEERING CO., INC.

Main Office and Works: 1307 North Branch Street, Chicago

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PULVERIZING, SEPARATING, AIR DRYING AND DUST COLLECTING EQUIPMENT

You can do it with the ATLAS TWIN FIFTY

Used with three leading wires the Atlas Twin Fifty Blasting Machine fires a *first* and a *second* series of 50 caps each—with an interval of *only a few thousandths of a second between*—at a single stroke of the rackbar! Accuracy in directing the force of explosives is greatly increased by this slight interval between firing. In actual performance, fragmentation has been increased . . . back break reduced . . . pulverization lessened!

The Atlas Twin Fifty Electric Blasting Machine makes possible a great advance in the application of the controlled force of explosives. Ask the Atlas representative to tell you more about it.

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ATLAS
EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES

THEY "SAVE EVERYTHING BUT THE SQUEAL"—WITH RUBBER

A Typical Example of Goodrich product development

PACKING plants found out, a few years ago, how to salvage the hair from the hog, and so "save everything but the squeal." Giant rubber scrapers churn, and scrape the hair from the carcass. But 200-pound hogs soon wear out and break off the scrapers—hair becomes expensive.

Then a manufacturer of machinery had an idea and came to Goodrich with it. We helped him work out a scraper of a different rubber compound and shape, that stands up under the weight and impact of the hog and resists the chemicals in the scraping bath. These Goodrich scrapers will clean 50 to 100 per cent more hogs than the old type.

Costs cut substantially! Remarkable? New Goodrich developments are doing it nearly every day. Rubber, as Goodrich can now compound it, will—

—flex indefinitely without breaking . . . and Goodrich transmission belts set new performance records.

—withstand abrasion . . . and Goodrich gravel chutes, ball mill linings and a hundred other applications outlast steel 10 to 1.

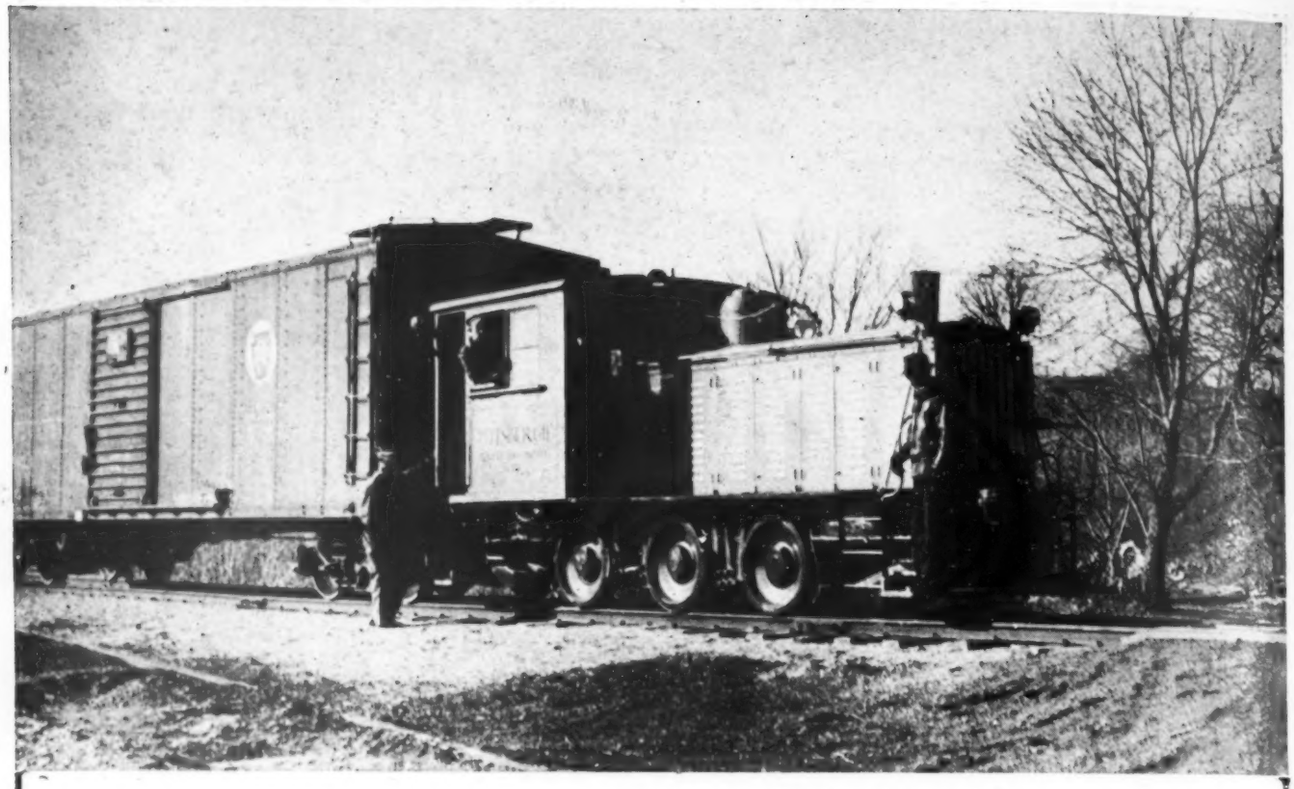
—resist chemicals, oil, time itself . . . and Goodrich-lined tanks and pipes drastically reduce pickling, plating, chemical handling costs; Goodrich hose lasts longer; Goodrich gaskets form life-long seals.

—adhere to metal . . . and industry seizes upon abrasion shoes for airplanes, vibration dampeners for countless products, rubber-lined tanks and tank-cars.

Goodrich is always busy with development work on rubber. No product is too "staple" to share in this improvement which extends to hundreds of items made by The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

Goodrich

ALL *products problems* IN RUBBER



30 ton direct drive Butane locomotive, Pittsburgh Plate Glass Co.

*IT'S A NEW KIND OF LOCOMOTIVE!

Since last June, when the Acme Steel Co., Chicago, replaced TWO steam locomotives with ONE PLYMOUTH BUTANE-PROPANE locomotive, the Pittsburgh Plate Glass Co., the Joplin-Pittsburgh Railroad Co., and the LaSalle & Bureau County Railroad Co., followed suit . . . . BECAUSE . . . .

- Low first cost . . no more than a gasoline unit.
- Lowest maintenance cost of any internal combustion locomotive.
- Uses INDUSTRIAL FUEL . . usually cheaper than diesel fuel.

The Performance Is Remarkable!

* Since Plymouth shipped the first Butane-Propane Locomotive in June, 1935, Plymouth has delivered a total of 170 tons of this type machine.

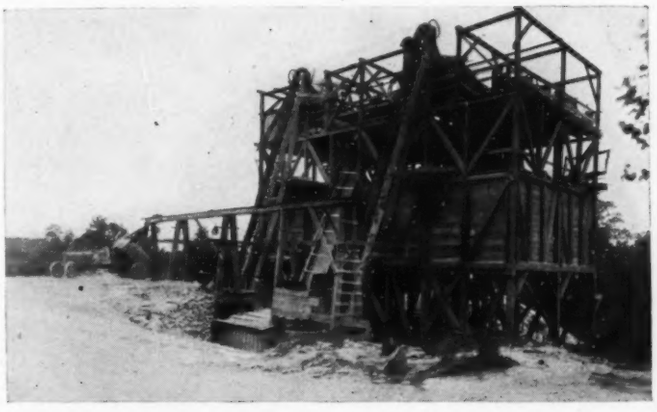
PLYMOUTH LOCOMOTIVE WORKS

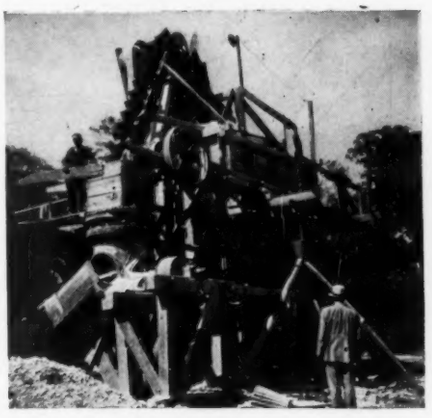
DIVISION OF THE FATE-ROOT-HEATH CO., PLYMOUTH, OHIO

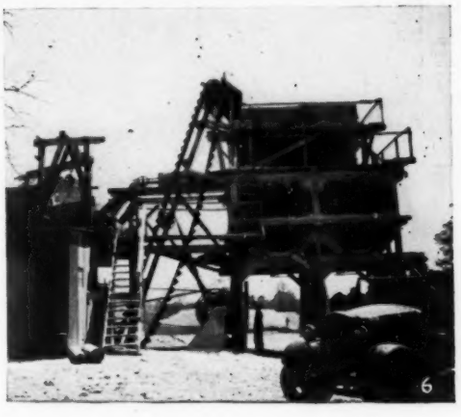
PLYMOUTH • SOLE BUILDERS OF BUTANE & PROPANE LOCOMOTIVES

The 1937 ANNUAL ILLUSTRATED REVIEW NUMBER of ROCK PRODUCTS

will be Distributed at the Conventions







Crushed stone plant operators will turn out in a body to attend the Convention of the National Crushed Stone Association to be held at the Netherland Plaza Hotel, Cincinnati, Ohio, January 18, 19, 20, 1937.

They will depend on the January Illustrated Review Number of ROCK PRODUCTS as their advance guide because it will contain floor plans of the exhibition booths together with the names of all exhibitors and their booth numbers, making it easy for operators whose interest has been aroused in a particular product to go directly to the booths where products they are interested in are exhibited.

The 1937 Annual Illustrated Review Number of ROCK PRODUCTS will be distributed from ROCK PRODUCTS' booth at the show — thereby providing added circulation at no extra cost.

The rock products industry is enjoying the greatest business increase in years. The huge expenditures by federal, state and city government and private enterprise demand an expansion and modernization program calling for the expenditure of millions of dollars for crushers, conveyors, belting, screens, trucks, compressors, power shovels, wire rope, haulage units, elevators, pulverizers, Diesel engines, storage bins, steel buildings and all types of equipment and accessories required by the industry.

Present your sales message to the executive operator subscribers of ROCK PRODUCTS who represent 92% of the purchasing power of the industry and who, as in past years, will use the Annual Illustrated Review Number as their buying guide and keep it right at their finger tips for quick reference — for an entire year. Make your space reservations at once.

A.B.C. **Rock Products** A.B.P.

205 W. WACKER DRIVE • CHICAGO, ILLINOIS

ENGINEERING EVOLUTION

PRODUCED THIS BARBER-GREENE..

... to Reduce Your Handling Costs

The Barber-Greene 24" deep standardized sectional steel truss carries the walkway in addition to a trough from the screen.

●

The new B-G totally enclosed transmission at the head end gives trouble-free transmission of power.

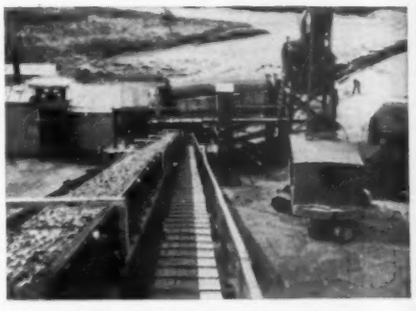
Here, "Engineering Evolution" means 20 years of constant refinement, of letting field practice guide engineering design to stronger units, higher capacities, lighter weight, greater spans, more flexibility, and longer life.

If this just sounds like "Sales Talk", you should see this Barber-Greene. Its 24" deep truss is of Sectional Construction, meaning stock shipment, easier erection, and complete "alterability".

It is powered by the new Barber-Greene enclosed transmission, an all steel, welded, dust tight, internally lubricated unit. The Carrier bases and brackets are of practically unbreakable all welded construction. The Carrier bearings are Self-Aligning Shafer Roller Bearings protected by 4 pass labyrinth grease seals.

The conveyor shown here is 135' long with a 24" belt. The spans are 28', and the truss carries a walkway and discharge trough for the washing plant over the bins.

The main point is that your Barber-Greene is kept here in Aurora as unassembled stock. We can select, on short notice, the size, drive, take-up, truss, carriers, etc., you need, all to be quickly assembled on your job, to exactly fill your own peculiar requirements.



This conveyor is equipped with the Barber-Greene roller bearing carriers. Ask for literature on Barber-Greene carriers.

●

Phone, wire, or write for complete information, there is no obligation

Standardized Material Handling Machines

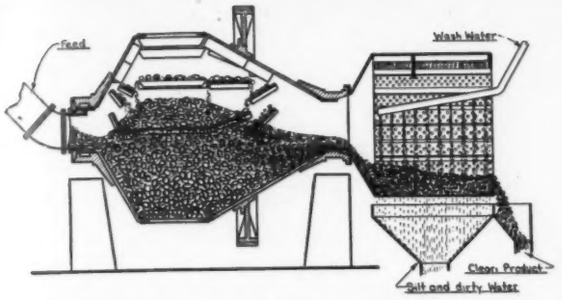
BARBER GREENE

459 West Park Avenue
Aurora, Illinois

AT THE SAND & GRAVEL CONVENTION

We Will Tell You About

The WHY of the CONES *of the* Hardinge Conical Scrubber



The Hardinge Conical Scrubber and Rinsing Trommel—Note the Great Depth of the Mass.

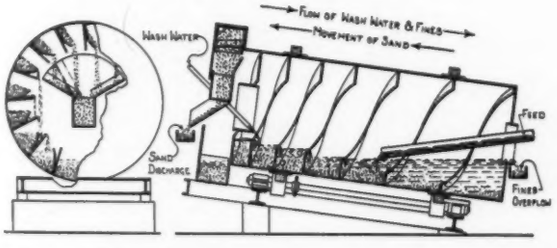
The Cones raise the level of material and bring the center of the mass to the largest diameter, away from the feed and discharge openings during rotation—see cut above—this gives greater mass weight and consequent disintegration of soft material. This also permits larger trunnion openings.

The Cones give a marked agitation of the mass, producing an intensive scrubbing action of harder particles against softer—this rubs clay balls to slime.

The Cones, which permit large trunnions, make it possible to use high shell speed—there are hundreds of more contacts of one particle against the other than is the case with cylindrical drums, trommel screens, logs, etc.

The Cones discharge the scrubbed product, without lifters—cutting power and reducing maintenance to a minimum. The Conical Scrubber will empty itself in a few minutes' operation without feed.

Write for Bulletin No. 37



The Hardinge Counter-Current Classifier or Washer Showing Spiral Integral with the Rotating Drum.

The Integral Spiral being attached to and rotating with the drum, rolls the material—does not scrape it—this eliminates dead corners, subjects all particles to constant contacts with counter current action of water, and practically eliminates wear.

The Integral Spiral permits starting under full load—it does not have to scrape through the dead mass.

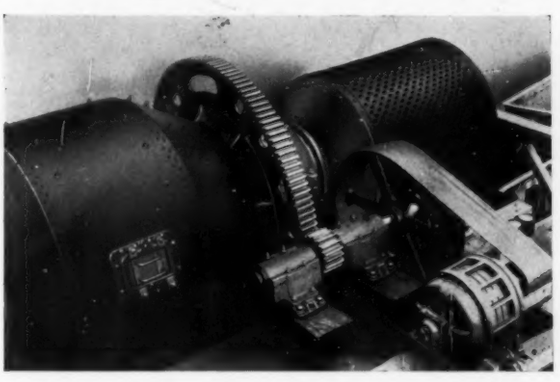
The Integral Spiral produces little or no agitation and thus does not upset natural classification and washing.

Write for Bulletin No. 39A

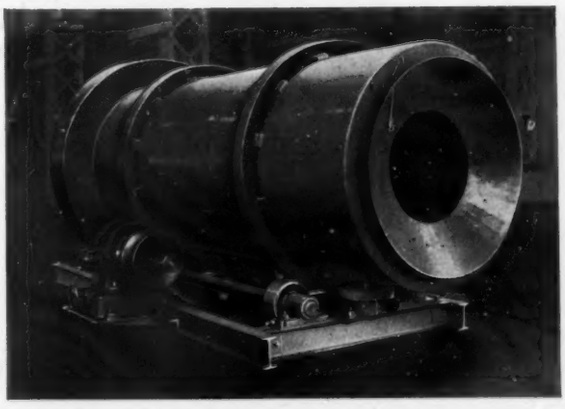
Booth No. 68 at Memphis, Dec. 7, 8, 9 & 10

HARDINGE COMPANY
INCORPORATED
YORK, PENNA.—Main Office & Works
NEW YORK—122 E. 42nd St. CHICAGO—205 W. Wacker Drive

The WHY of the INTEGRAL SPIRAL *of the* Hardinge Counter-Current Classifier and Washer

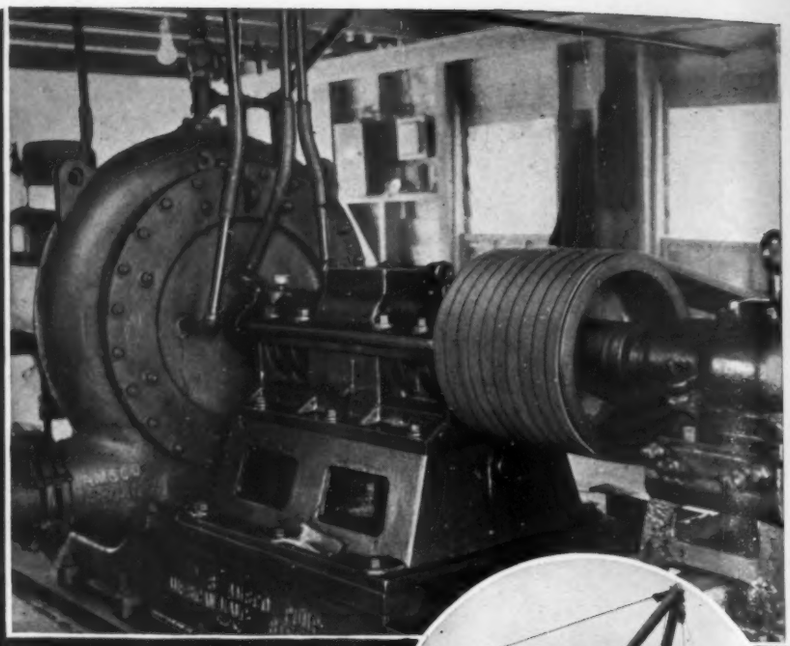


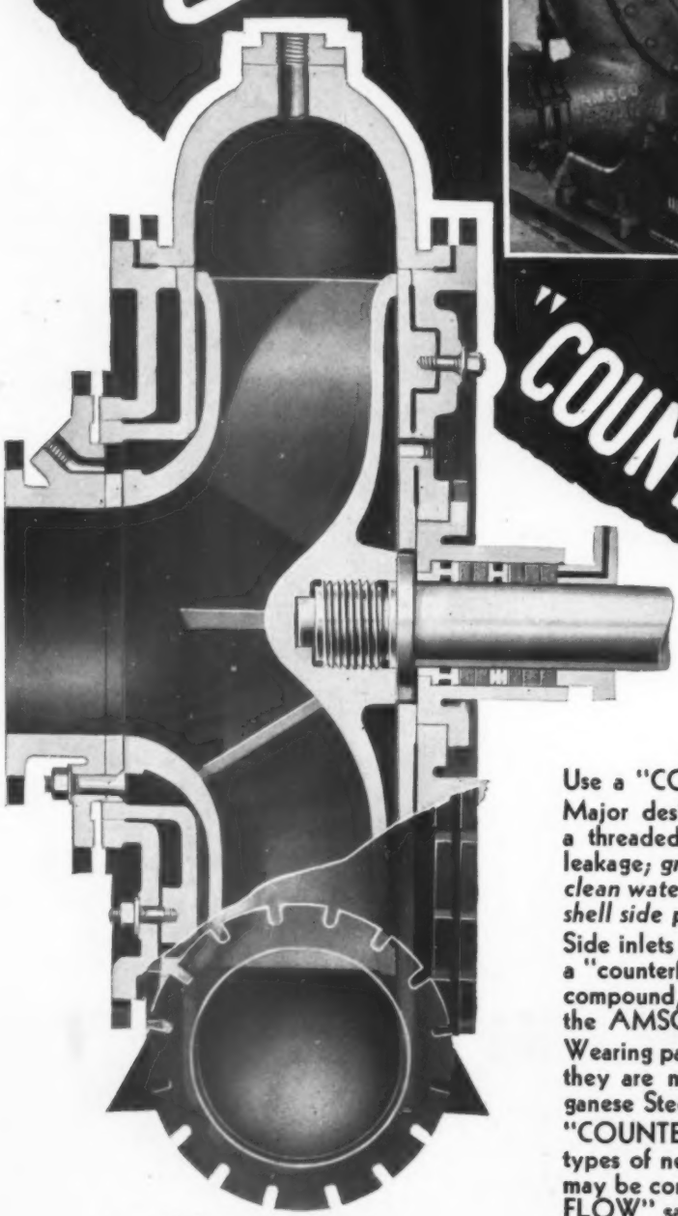
Installation View of Conical Scrubber Eliminating Soft Stone from Gravel and Rubbing Clay to Slime.



The Counter-Current Classifier or Washer Used for Classifying or Cleaning Sand, etc.

AMSCO "COUNTERFLOW" PUMPS





Section view showing the funnel mouth impeller, the "COUNTERFLOW" clear water inlets and chambers, and the use of a threaded bore and drive shaft.

Use a "COUNTERFLOW" Pump!

Major design advantages include: a wide funnel mouth impeller; a threaded impeller bore and drive shaft; a minimum of internal leakage; *greatly reduced internal wear accomplished by introducing clean water, under pressure, between the impeller shrouds and the shell side plates.*

Side inlets introduce clear water between the shrouds and plates with a "counterflow" action, replacing sand-laden water which is a cutting compound, with clear water which is a lubricant — thus the name, the AMSCO "COUNTERFLOW" Pump.

Wearing parts afford maximum impact and abrasion resistance because they are made of "the toughest steel known" — AMSCO Manganese Steel.

"COUNTERFLOW" design is not only available in all sizes and types of new AMSCO Pumps, but almost all pumps now in service may be converted at nominal cost to take advantage of "COUNTERFLOW" savings.

Send for detailed information on "COUNTERFLOW" Pumps and data on how to increase the life of your old pumps by making "COUNTERFLOW" changes!

AMERICAN MANGANESE STEEL COMPANY

Division of American Brake Shoe & Foundry Company

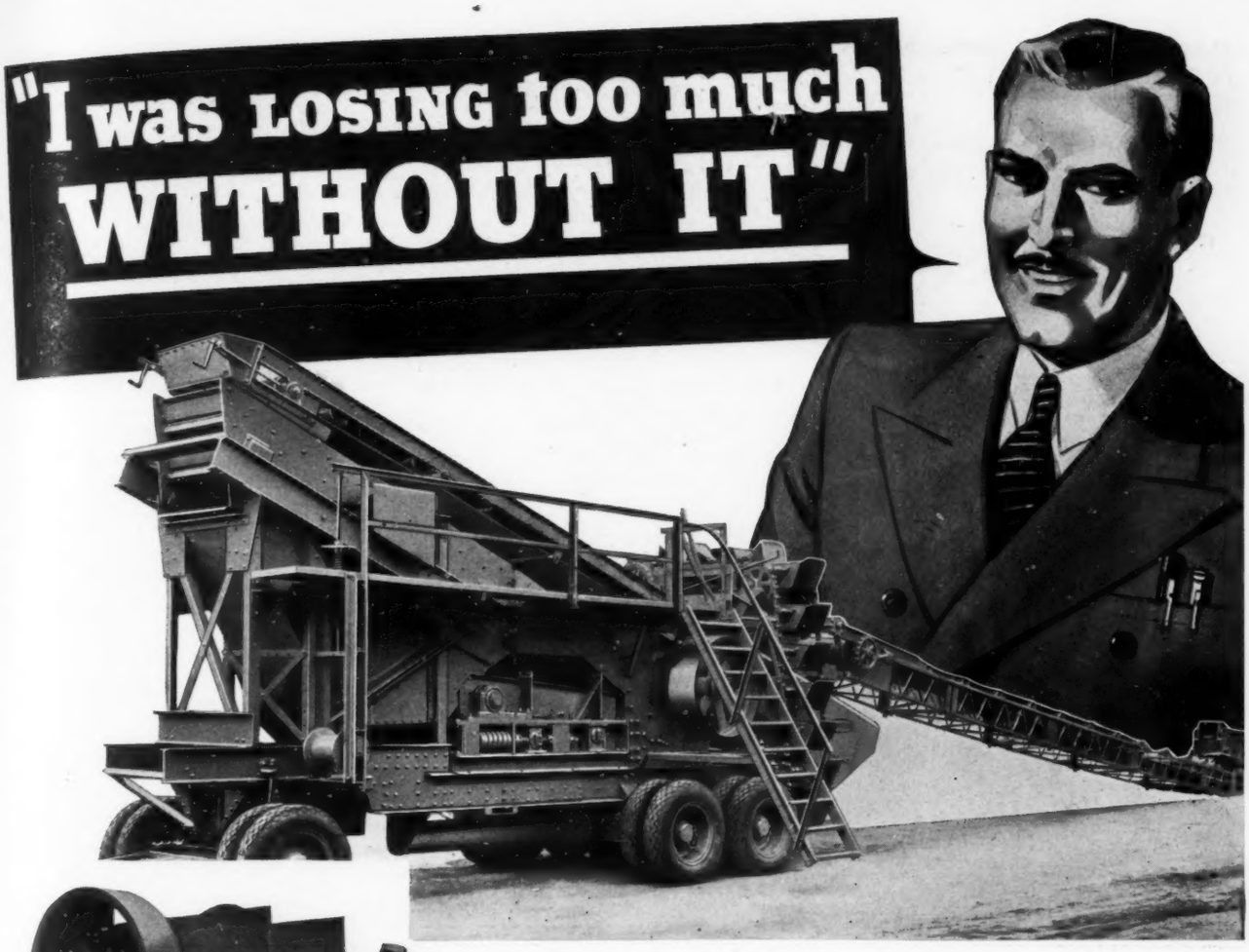
377 East 14th Street, Chicago Heights, Ill.

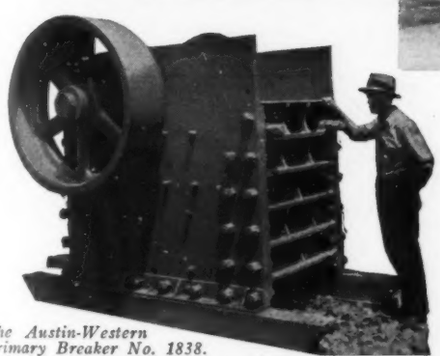
Foundries at Chicago Heights, Ill.; New Castle, Del.; Denver, Colo.; Oakland, Calif.; Los Angeles, Calif. • Offices in Principal Cities

AMSCO

TRADE MARK REGISTERED

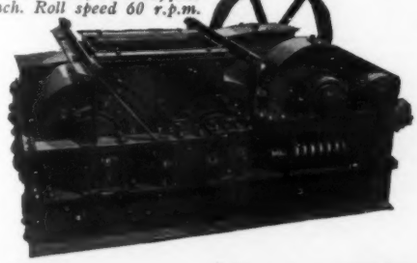
"I was LOSING too much WITHOUT IT"





The Austin-Western Primary Breaker No. 1838. This jaw-type crusher gives you large capacity at low cost per yard. With best roller bearings available, it operates at full capacity without bearing or shaft troubles.

The Austin-Western Roll Crusher No. 3018 Available in one size, using 50 gasoline horsepower. Roller diameters (with 2 inch manganese shell) 30 inch, face 18 inch. Roll speed 60 r.p.m.



Austin-Western Crushing and Screening Plants Let You

meet all competition

Progressive fixed plant producers are buying Austin-Western Portables. They are being awarded business at a profit where haulage costs formerly shut them out.

A Portable is good insurance. It lets you diversify. It protects you from the loss of a contract. It keeps you in the bidding—enlarges your market.

The Number 100 Portable Plant has a 9 by 40 inch primary roller bearing jaw crusher and an 18 by 38 inch roll (or 4 by 40 inch jaw) crusher for reduction crushing.

All portable plants have oversize shafts and roller bearings throughout. They are built to meet the growing demand for smaller sizes of stone now so generally used for road construction.

Compact for easy transport on steel or pneumatic tired wheels, they can be set up for operation in a few hours.

THE AUSTIN-WESTERN ROAD MACHINERY CO.
Aurora, Illinois

Austin-Western

ROAD GRADERS · MOTOR GRADERS · ELEVATING GRADERS · DRAGS
ROAD ROLLERS · DUMP WAGONS · DUMP CARS
SCARIFIERS · BULLDOZERS · TRAILERS · SCRAPERS · PLOWS
BITUMINOUS DISTRIBUTORS · ROAD-MIX MACHINES · CULVERTS
CRUSHING AND WASHING PLANTS · SWEEPERS AND SPRINKLERS · SHOVELS · CRANES · ETC · SNOW PLOWS

The Austin-Western Road Machinery Co.
V, Aurora, Ill.
Please send details on.....
Address.....
Name.....
City.....State.....

The Convention of THE NATIONAL CONCRETE MASONRY ASSOCIATION . . . FIRST NATIONAL CONFERENCE OF CONTRACTORS . . . THE CAST STONE INSTITUTE . . . THE AMERICAN CONCRETE PIPE ASSOCIATION . . . THE NATIONAL CINDER CONCRETE PRODUCTS ASSOCIATION

To be held at the Sherman Hotel, Chicago, Ill.
JANUARY 18, 19, 20, 1937

These five bodies will hold their conventions simultaneously to discuss new ideas and sales methods.

Leading contractors and engineers will reveal the details of modern concrete construction practices.

Specialists will analyze the growing market and leaders in the field of advertising and promotion will show where and how business can be increased.

A highlight of the program on the subject of the concrete house will be the complete construction and cost story of the Purdue University's research house.

Another feature will be movies showing how concrete can be pumped easily and quickly to all parts of a small job.

New types of forming, how to use color, and how to finish concrete floors are typical of other subjects to be presented.

While planned for the concrete contractor, the program will also be of interest to contractors who are not at present specializing in concrete construction, but who want to get up to date on the progress in the industry.

Several joint sessions have been scheduled to make it possible for the related industries to promote harmony and cooperation in the interest of progress in the construction field.

Climaxing the conventions will be a large exhibit of concrete machinery, accessories and materials assembled for the exclusive inspection of concrete users.

MANUFACTURERS!

CONCRETE PRODUCTS, which is now combined with ROCK PRODUCTS, will carry this added prestige and besides reaching the entire list of ROCK PRODUCTS prosperous executive subscribers, will in addition be mailed to the regular CONCRETE PRODUCTS' subscription list. Copies will likewise be distributed at the joint conventions at Chicago.

Here is an opportunity to reach every worthwhile executive in all branches of your industry with your sales message in the JANUARY ISSUE, which will be of exceptional sales stimulating value, because CONCRETE PRODUCTS is now a part of the BIG ANNUAL ILLUSTRATED REVIEW NUMBER of ROCK PRODUCTS—the issue for many years recognized as a buyers' guide and kept and referred to by the executive subscribers during the entire year.

Never before have advertisers in CONCRETE PRODUCTS been confronted with such an opportunity to reach every potential prospect at such low cost.

Arrange for the amount of space you wish to use—NOW! Come to the convention and meet the men who read your message and come away with the memories of a good time — new friends — new contacts and — business contracted for.

Advertising rate upon application.

THE BOSS SAYS...

"It's O.K."

BRANCH OFFICES

Birmingham, Ala.
1304-6 North First Ave.
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Chicago, Ill.
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Denver, Colo.
760 Downing Street
El Paso, Texas
1417 Texas Street
Los Angeles, Calif.
2001 Santa Fe Ave.
Martinsburg, West Va.
100 South Raleigh St.
Michigan
222 Heath St., Negaunee
New England
457 Washington St.,
Newton, Mass.
New York City
200 Church St.
Richmond, Va.
12 North 15th St.
Salt Lake City
501 Dooly Bldg.
San Francisco
Folsom at 17th St.
St. Louis, Mo.
1375 Railway Exchange Bldg.

● And the Boss knows. He came up through the ranks, and has run every make and size of jackhammer. He knows when a drill holds right—when it is cutting like lightning and blowing the hole like a Kansas tornado. It's his job to get the drilling done at the lowest cost per foot of hole. So he tries out a Cleveland H11 and says "O. K."

● The H11 will be O. K. on your job, too. You will be simply amazed at the speed with which it cuts into rock—soft, hard, or in between. Operators like the H11 because it holds so easy, and because it gets the work done in a hurry. Bulletin 118 sent on request.

THE CLEVELAND ROCK DRILL COMPANY

3738 East 78th Street — Cleveland, Ohio, U. S. A.

Cable Address "ROCKDRILL"

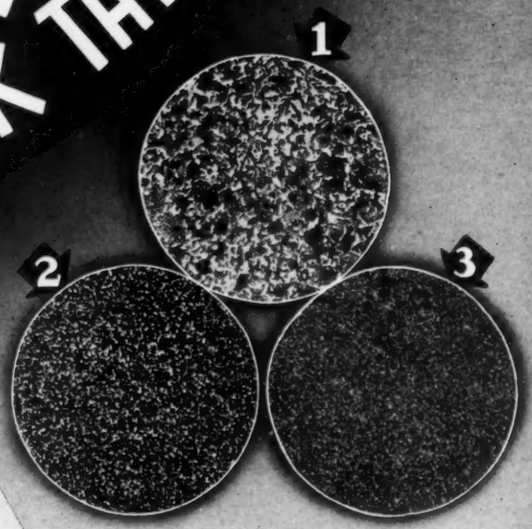
Spare Parts Stocks Maintained in the Principal Cities and Mining Centers

LEADERS IN DRILLING EQUIPMENT

LIMA USES SPECIAL STEELS SUITED TO THE WORK THE PARTS ARE TO PERFORM

LIMA

ALLOYS used in the manufacture of LIMA excavators have been especially developed for the work the parts are to perform. Rigid tests, both physically and chemically, are made to ascertain that the steels are properly annealed and heat-treated. These tests are made in LIMA'S own up-to-the-minute laboratory, under expert supervision of men who are responsible for the steels that go into the manufacture of Lima Locomotives. This highly important feature is but one of the many precautions taken by LIMA to assure the customer that he is getting a machine that will withstand the most severe service with only the minimum delay.



CARBON STEEL CASTINGS

1 Used where maximum strength combined with ability to withstand torsional and shock loads is required, such as truck base and revolving base castings.

CARBON STEEL FORGINGS

2 Used where bulldog resistance to bending under heavy loads is required, such as axles.

CHROMIUM NICKEL HEAT-TREATED STEELS

3 Used where shock loads combined with severe torsional and bending stresses are encountered, such as machinery shafts.

LIMA LOCOMOTIVE WORKS, INCORPORATED

SHOVEL and CRANE DIVISION — LIMA, OHIO, U. S. A.

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77 McCall Street

SEATTLE
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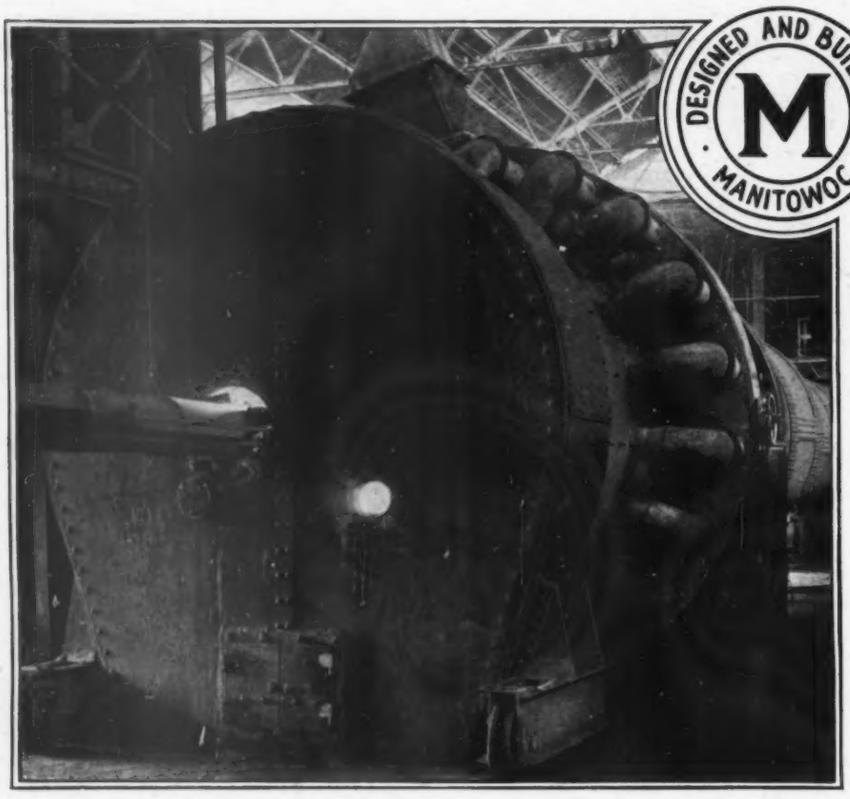
LIMA

SHOVELS — DRAGLINES — CRANES — CLAMSHELLS

The VANDERWERP RECUPERATOR for Rotary Kilns



Correct in Principle

Proved in Practice

The VANDERWERP RECUPERATOR alone meets the full requirements of kiln operators, assuring the ultimate in heat recovery from clinker and the maximum benefits from rapid air quenching.

Because: The heat exchange is made within the kiln, thoroughly insulated against radiation losses.

Air quenching is effected at the point of maximum temperature differential between clinker and cooling air.

The proof of these statements is perhaps best evidenced by the number of orders on hand, totaling twenty units in addition to those already in operation.

Write, without obligation, for full particulars

MANITOWOC ENGINEERING WORKS

Division of Manitowoc Ship Building Corporation

GENERAL OFFICES AND PLANT, Manitowoc, Wisconsin — CHICAGO OFFICE, 131 E. River St.

Crushing WET ORE CONTAINING CLAY AND TALC

1 *Telsmith-Wheeling Roller Bearing Jaw Crusher.*

2 *Telsmith Pulsator*

3 *Telsmith Gyrasphere Crusher*

To develop their Comet Mine, the Basin-Montana Tunnel Co. of Basin, Montana, after the most careful investigation, selected Telsmith crushing equipment. Operation, begun early in 1934, has been continuous. The mill is now operating at 200 tons per day, with an ample margin of surplus crushing capacity.

The metals mined are zinc, lead, silver and copper, with some gold. Ore is very hard and abrasive. Much of the rock is wet, containing clay and talc, making a difficult crushing problem.

Ore from the mine first passes through a 9″ x 30″ Telsmith-Wheeling Roller Bearing Jaw Crusher and is crushed to about minus 1½″. Then it is conveyed to a 2′ x 6′ Telsmith Single Deck Pulsator, with ⅜″ square openings in screen cloth. Oversize from this vibrating screen goes to a No. 24 Telsmith Gyrasphere Crusher originally set to deliver minus ½″, now minus ⅜″ product. According to the management this Gyrasphere has given excellent service . . . crushing from 5700 to 11,000 tons of ore with one set of manganese wearing parts, this wide variation being due to the change in adjustment. Oiling system is positive, without dust seal failures. Repair expense is moderate; mechanical performance has been satisfactory; and power consumption low. The Basin-Montana people report, "We like Telsmith equipment."

Write for descriptive Bulletins—Y-11 Telsmith Gyrasphere Crusher; W-11 Telsmith-Wheeling Jaw Crusher; V-11 Telsmith Pulsator.

TRAMP IRON DOES NOT STOP TELSMITH

Actual photograph of tramp iron which passed through both Telsmith Jaw Crusher and Gyrasphere Crusher in plant of Basin-Montana Co., yet failed to damage either crusher in any way.

SMITH ENGINEERING WORKS, 508 E. CAPITOL DRIVE, MILWAUKEE, WIS.

Associates in Canada: Canadian Ingersoll-Rand Co., Ltd., Montreal, Toronto, Winnipeg, Vancouver. M-5

50 Church Street, New York City
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201 N. Wells, Chicago, Ill.
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TELSMITH

Fast DIGGING
Full CARRYING
Free DUMPING

RED ARCH dragline buckets dig with a quick fill . . . a smooth carry . . . a clean dump. They combine modern design with modern welded construction and modern lightweight alloy-steels. They are built to give increased yardage . . . and to deliver long-life service. Made in three types—"AU" "AX" and "Y"—for light, medium, and heavy digging, and in all standard sizes to 12 cubic yards. There is a RED ARCH bucket to fit your exact needs. Send today for illustrated bulletins.

205W

BUCYRUS-ERIE

EXCAVATING, DRILLING, AND MATERIAL-HANDLING EQUIPMENT...SOUTH MILWAUKEE, WISCONSIN

Rock Products

WITH WHICH IS INCORPORATED CEMENT and ENGINEERING NEWS FOUNDED 1896 . . .

Volume XXXIX | Chicago, December, 1936 | Number 12

Re-Establishing "the American System of Government"

INDUSTRY AND BUSINESS seem now seriously concerned about "preserving the American system." From the announced intention of such groups as the National Association of Manufacturers and the Chamber of Commerce of the United States "to coöperate" with the President, it appears that business leaders see little hope of heading off many New Deal objectives, but doubtless they realize that it is not too late to have a hand in molding the methods adopted to accomplish them.

Both candidates for the Presidency constantly reiterated their faith in the American system of government and their purpose to maintain it. There was not, and is not now, the least reason for believing that the President is any less sincere than his recent opponent.

It is a good time for everyone to think about our American system, because notwithstanding constant reference to it, it has not been clearly defined. Both presidential candidates and many others continually referred to our government as a democracy—something it has obviously too closely approached; but it was not originally intended to be a national democracy, and the Constitution was purposely drawn to prevent its being a national democracy, as every reader of history knows.

The government of the United States was founded by the Constitution as a federal republic, which is something entirely different from a national democracy. The bulwark of the whole structure was local democracy in the election of responsible local and state officers, or representatives, but even the greatest Democrat of them all, Thomas Jefferson, did not believe in national democracies, which to him meant mob rule. He had seen enough of that in the French Revolution to shake his faith in the ability of the mob to select their national leaders wisely. He did believe they could select from among themselves those competent to represent them in the national government, and that these representatives of the people could and would be held strictly accountable for their acts as the national government to the people who elected them.

The keystone of our American system of government is therefore local, personal, individual responsibility. It is just as absurd now, as it was when the Constitution was framed, to believe that the mass of people of any nation can decide critical national issues involving the very charter of their freedom by a majority vote. They have still to demonstrate that they can decide local issues wisely, or even choose competent local governments. By the Grace of God they have elected a national leader who apparently does not intend to take advantage, for personal aggrandizement, of the severest test our American system of government has yet had to face. But the dangers are there, as the President himself has very frankly pointed out.

It matters not at the moment how wise or desirable are many of the new laws on our national statute books. They are there as a result of the breaking down of local, personal and individual responsibility in a variety of ways. That many of these laws are necessary because of the practical erasure of state lines has never been proved, because many such measures were forced on the national government not for this reason but by the supineness and failure of each and all of us to assume responsibilities that our American system of government was designed to have us accept. State lines are merely convenient boundaries for local self-government.

The way to head off an all-powerful national government or bureaucracy that inevitably will destroy the last vestige of individual liberty, of freedom of individual action and freedom of opportunity is not to attack the capstone of the structure, but the foundations upon which it has gradually been built up. If we really want to preserve the American system of government we must go back and reëstablish our reliance on responsible local self government. We must assume local, personal and individual responsibility for the solving of as much of our many national problems as is possible by direct coöperation rather than by forced coördination through the national government. While the summation of numerous local problems, such as that of unemployment, makes a national problem, it is equally true that the national problem never will be efficiently or satisfactorily solved until it is again redivided into small enough local segments to be tackled intelligently by men of ordinary capacity—and most of us are men of ordinary capacity.

Therefore, the announced intention of business leaders to coöperate in solving this problem is the only sound step they have made in respect to it in a long time. The national government could not do otherwise than it has without the active, honest and whole-hearted coöperation of a great host of men in business and industry. Possibly it may not do any differently with such coöperation, if provided, but leaders of business and industry would be worse than negligent if they did not now accept without reservation responsibilities so clearly apparent, assuming that they too are sincere in wanting to save the American system of government—which is as much responsible local government as consistent with the general welfare of the United States; and all local government not only can be but should be consistent with the general welfare.

Sand and Gravel Convention Plans

NATIONAL SAND AND GRAVEL ASSOCIATION, Washington, D. C., has announced plans for its 21st annual meeting at the Peabody Hotel, Memphis, Tenn., December 7, 8, 9 and 10, in brief as follows:

Monday, December 7: At 10:00 a.m., on Monday, December 7, the board of directors will hold its annual meeting. At 6:00 p.m., there will be a buffet supper at the Hotel Peabody, immediately following which will be the formal opening of the machinery and equipment exhibition sponsored by the Manufacturers Division of the Association.

Tuesday, December 8: While the convention program is subject to later correction, it is complete as to its details. At 9:30 a.m., on Tuesday, December 8, the convention will be called to order by President Foster. After his opening address and the reports of the executive secretary and of the director of engineering are received, as well as the report of the committee on finances and budget, the first speaker will be Major Roy F. Britton, director of the National Highway Users Conference, whose subject will be "Are We Through Building Highways?" Major Britton is a recognized authority in his field and his address is extremely timely to the sand and gravel industry.

How's Business

On Tuesday afternoon, the first order of business will be the report of the committee on revision of the constitution of the association, of which Alex W. Dann, Pittsburgh, is chairman. He will be followed by Thomas S. Holden, vice-president of the F. W. Dodge Corp., New York City, and president of the New York Building Congress, who will devote his remarks to a question of current interest in this industry: "The Revival of Private Construction and the Prospects for 1937."

When Mr. Holden has concluded his remarks, there will be the annual feature of the open forum on business conditions in the sand and gravel industry. This is always a highly valuable session of the annual assemblies of the sand and gravel industry, because it enables the industry to get a first-hand understanding of exactly what happened in the sand and gravel industry in the preceding year, as well as the anticipations for the coming year. As an indication of what this open forum will produce in the way of valuable information, listed below are the questions which the various speakers have been asked to answer for the areas in which their respective companies operate.

(1) What was the volume of sand and gravel business in your area in 1936 as compared with 1935?

(2) How did the price level in 1936 compare with the price level in 1935?

(3) What relation did volume of demand bear to capacity in your area in 1936?

(4) Approximately what percentage of the sand and gravel business in your area in 1936 went to (*a*) highway construction, (*b*) building construction, (*c*) railroad ballast, (*d*) other uses?

(5) What is the prospect for sand and gravel business in your area in 1937? Will it represent an increase or a decrease compared with 1936? What is the outlook as to prices?

(6) How, approximately, will sand and gravel demand in your area during 1937 be distributed as between (*a*) highway construction, (*b*) building construction, (*c*) railroad ballast, (*d*) other uses?

(7) To what extent have gasoline tax proceeds been diverted from highway construction and maintenance in your area? If this is not a problem, how has it been avoided?

(8) To what extent has the sand and gravel industry in your area suffered from plants operated by divisions of government? To what extent has the WPA program aggravated the problem of governmental production of our materials?

(9) To what extent have portable plants replaced stationary plants in your area, and what, in your judgment, will be the trend in this connection in the future? Have established producers in your area used portable plants to supplement stationary plants?

Safety—Workmen's Compensation

Wednesday, December 9: This session will open at 9:30 a.m., with an address by Franklin K. Wills of the Warner Co., Philadelphia, entitled "Safety Through Plant Organization." The Van Sciver plant of the Warner Co. has the distinction of having won a trophy in the safety contest of the National Sand and Gravel Association for the past five years, this plant having operated 124,767 man-hours during 1935 without a lost-time accident.

Next will be an address by Hon. Vincent M. Miles, member of the Federal Social Security Board, on the practical operations of the Social Security Act. The industry wants to know more about the unemployment compensation insurance provisions and the old-age annuity provisions of the Social Security Act. This address has been designed to meet that need.

One of the most important legislative enactments in many years was the Robinson-Patman Price Discrimination Act. It will be discussed at Memphis.

While workmen's compensation insurance legislation now operates in 46 states, only about 16 states have occupational disease laws. Many people believe that ultimately all states will enact occupational disease legislation. Such legislation will have its impact on the sand and gravel industry. The program committee has selected a man outstanding in this field to address the convention—David S. Beyer, vice-president of the Liberty Mutual Insurance Co., whose subject will be "What the Employer Should Know About Silicosis and Other Occupational Diseases." Following Mr. Beyer will be a representative of one of the important highway departments of the United States, who will address himself to the question of planning and executing a well-balanced highway program.

At 1:00 p.m., on Wednesday, will be a joint luncheon of producers and members of the Manufacturers Division of the Association. The winners of the trophies of the safety contest among members of the National Sand and Gravel Association will receive their awards at that time, these being the Warner Co. for its Van Sciver plant, and the American Aggregates Corp. for its Green Oak plant in Livingston County, Michigan. There will then be an address of welcome by the Hon. Watkins Overton, mayor of Memphis, and following his appearance, there will be an important address by the Hon. Walter Chandler, member of the Judiciary Committee of the House of Representatives, whose subjects will be "The Interest of Business in Federal Legislation."

Wednesday afternoon will be left open for a more complete inspection of the machinery and equipment exhibition.

On Wednesday evening, at 7:00 p.m., there will be the annual banquet of the association. There will be no speakers at this banquet, but there will be a program of entertainment, and an orchestra will be furnished for dancing.

Technical Discussions

Thursday, December 10: Beginning at 9:30 a.m. the program will be devoted to a comprehensive discussion of the engineering problems of the sand and gravel industry. Prominent among the speakers are P. J. Freeman, principal materials engineer of the Tennessee

Safety trophies to be awarded to prize winners of National Sand and Gravel Association contest

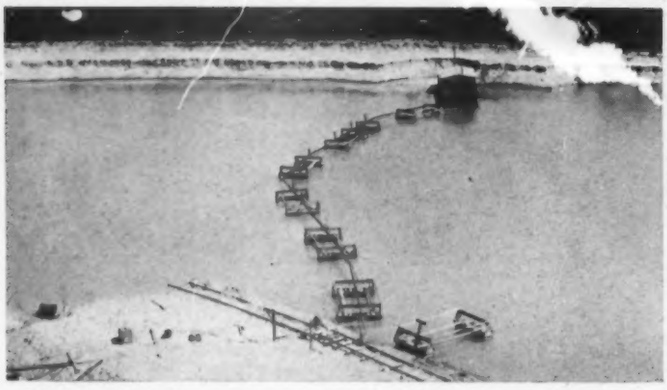
Valley Authority, and C. H. Scholer, professor of applied mechanics, Kansas State College of Agriculture, and chairman, Department of Materials and Construction of the Highway Research Board. Mr. Freeman will discuss some of the special problems relating to aggregate specifications for sand and gravel used in the construction of large dams. This he is eminently qualified to do not only because of his close contact with the work of TVA but also because of his broad experience in concrete construction over a period of many years. Professor Scholer will discuss, in an authoritative manner, the many important characteristics of aggregates on which further information is needed before the design of structure utilizing aggregates can be placed on a completely scientific basis.

Messrs. Foster and Walker are collaborating in the preparation of a report on "Strength and Wear Tests of Gravel and Crushed Stone Concrete", based on an extensive investigation carried out by the Warner Co., in which Mr. Walker coöperated in a consulting capacity.

T. E. McGrath will give the benefit of specialized experience gained in finding a market for plant-prepared sand and gravel in traffic bound roads. J. L. Shiely will talk on the hardships encountered by the sand and gravel producer in meeting unnecessarily stringent specifications for aggregates; his discussion will be authoritative and based on his recent experiences in furnishing materials for large projects. During the afternoon there will be a discussion of the use of sand and gravel in bituminous mixtures, a growing market for the sand and gravel industry; a discussion of dredging methods for excavating sand and gravel by Irving Warner, who will be able to draw from a broad experience gained as vice-president and chief engineer of the Warner Co.; and a paper by H. Herbert Hughes, who handles the statistical studies of sand and gravel for the U. S. Bureau of Mines, on the "Economics of the Sand and Gravel Industry."

Exhibitors

Allis-Chalmers Manufacturing Co.
American Manganese Steel Co.
American Steel and Wire Co.
Austin-Western Road Machinery Co.
Blaw-Knox Co.
Bucyrus-Erie Co.
Caterpillar Tractor Co.
Chain-Belt Co.
Cross Engineering Co.
Eagle Iron Works.
Fairbanks, Morse & Co.
General Electric Co.
Hardinge Co.
Harnischfeger Sales Corp.
Hendrick Manufacturing Co.
The Jaeger Machine Co.
Kensington Steel Co.
Koehring Co.
A. Leschen & Sons Rope Co.
Lima Locomotive Works, Inc.
Link-Belt Co.
Marion Steam Shovel Co.
Morris Machine Works.
Nordberg Manufacturing Co.
Northwest Engineering Co.
Pettibone Mulliken Co.
Pioneer Gravel Equipment Mfg. Co.
Pit & Quarry.
ROCK PRODUCTS.
Robins Conveying Belt Co.
John A. Roebling's Sons Co.
Simplicity Engineering Co.
Taylor-Wharton Iron & Steel Co.
The Thew Shovel Co.
Traylor Engineering & Mfg. Co.
The W. S. Tyler Co.
United States Steel Corp. Subsidiaries



Bank of natural round grain sand at Millville, N. J.

One of three dredges of New Jersey Sand Co.

Exacting Specifications for Foundry Sands

Met By Continuously Improving Operations of the New Jersey Silica Sand Co., Millville, N. J.

By C. W. Thompson

Specifications for iron and steel foundry sands have become much more rigid in the last two or three years. Considerable plant changes must be made to meet these conditions.

The New Jersey Silica Sand Co., Millville, N. J., specializes in sands for foundries and has been making continuous improvements since its first shipment was made in 1921. The directing heads know the value of efficient machinery which allows the workers to complete their daily tasks under better circumstances and with greater ease. They pay in wages a little more than usual in their line and find that it has been profitable because it has attracted high-grade employes.

Improvements were made recently to assure more uniform shipments and to provide additional storage facilities. Shipments from storage can be made more promptly and with a minimum amount of moisture in the grades that are furnished damp. In addition to these improvements, many unique methods were applied to meet preparation conditions encountered by the company.

A complete new wash-plant, producing a round grain sand for the steel foundries, was built in 1935. Steel was used in the construction, assuring rigidity and longer life of the plant. Screens, both revolving and vibrating, are used; and the size of these are such that they will take care of the variation of the load of sand and water supplied by centrifugal sand pumps.

The bank of sand supplying this plant contains 60% No. 6 to No. 60 mesh grains and finer grains to No. 270 mesh. The No. 6-60 mesh grains are graded by these screens and the minus 60-mesh grains are graded by the use of a series of Link-Belt sand classifiers. To retain the very fine sand, a series of settling boxes is used, and the sand dewatered and carried to storage by Japanese paddle lines.

Storage for every grade has been provided for at this plant. The Link-Belt belt conveyors are used. The new type Webster tripper aids in making quick changes in the storage location.

Washing plant recently completed to prepare round grain sand for steel foundries

The wash-plant and drying-plant that furnishes dry sand and sand-blast sands to foundries also furnishes a No. 40 mesh sand to the glass industry for making flint glass. For a number of years the No. 40 mesh sand was taken from the coarser dry sand by vibrating screens, and then it was taken by gravity and water to concentrating tables, where the trace of free-iron was taken from the sand. It was then stored damp and dried the second time before shipment.

To take care of one drying, which is costly, for it is done over steam coils, the No. 40 mesh grade is subsequently made in the primary washing process by the use of the largest type Link-Belt sand classifier. It is stored or taken directly to the concentrating tables, and then only one drying is necessary. To double-check gradation by the sand

classifier, a vibrating screen is used to rescreen the material before it is stored in an 800-ton silo. This vibrating screen is located on the top of the silo.

Moulding sands are furnished to foundries, and it has been necessary to blend sands to meet the given specifications. Conveying sands to the muller and screen becomes a greater problem when blending is necessary. Ford and Chevrolet trucks are used; and in order to take heavier loads over unimproved roads, oversize tires are used.

Improved equipment, high-grade employes, storage facilities and general good sand plant housekeeping, together with a very uniform source of the raw materials are recognized and commented on by our many customers.

Changed Ownership

BELLAMY SAND AND GRAVEL CO., organized by H. D. Bellamy, Des Moines, Ia., and his two sons, Frederick E. and Howard, has purchased the gravel pit of the Correctionville Construction Co., Correctionville, Ia., and will build a modern plant. Mr. Bellamy is also a partner in the Concrete Materials Co., Waterloo, Ia.

Trapped on Top of Bins

FRED SCHMITT MATERIAL CO., St. Louis, Mo., building supply dealer, had a fire in its plant November 5, which cost the lives of four employes, including Fred Schmitt, Jr., manager of the plant. The men were trapped on an upper floor of a structure housing the bins containing sand and gravel.

New Enterprise

MISSOURI REDUCTION CO., Flat River, Mo., has been organized by St. Louis and Denver capitalists to recover and market the old chat pile of the National Lead Co.

New Derrick

CUMBERLAND RIVER SAND CO., Nashville, Tenn., has applied to the U. S. War Department for permission to erect a barge-unloading derrick on the right bank of the Cumberland River at Clarksville, Tenn., on property formerly owned by the Ewing Lumber Co.

Accident Kills Superintendent

GENERAL CRUSHED STONE CO., Easton, Penn., lost the superintendent of its Auburn, N. Y., plant, Walter J. Weiman, on November 11, through an accident. He was assisting three men to load two cars of asphalt-coated stone. While riding one of the cars and directing its switching by means of a bunting pole and motor truck, it is presumed he lost his balance and fell under the car.

Destroyed by Land Slip

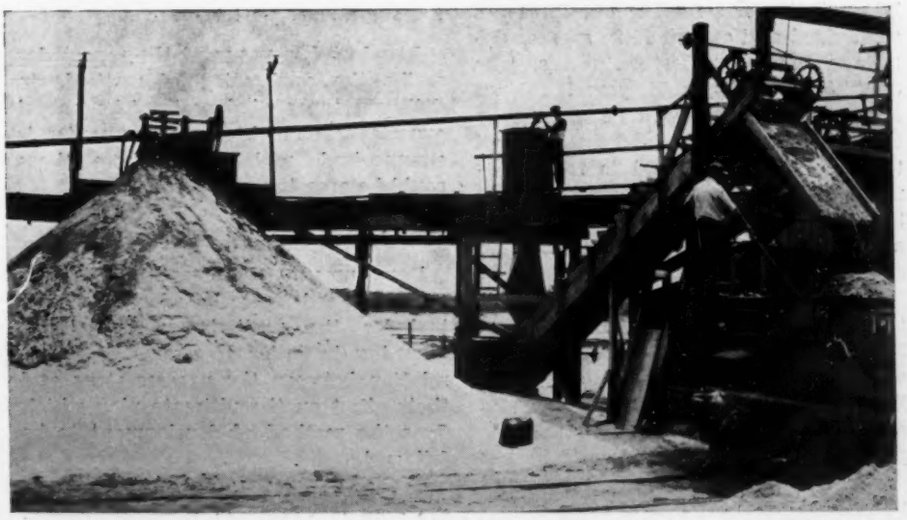
LATTA BROOK SAND AND GRAVEL CORP., Elmira, N. Y., plant on Latta Brook road has been practically destroyed by a slow, progressive land slip.

Lime Plant Projected

SUPERIOR BRICK CORP., St. Louis Park, Minn., sand-lime brick manufacturer, is said to be contemplating construction of a modern lime plant.

Storing provisions at New Jersey Silica Sand Co. A moulding sand screen is at right

Settling boxes for grading very fine sand. Paddle-lines dewater and convey sand to storage



One of the sand classifiers. Partially dewatered sand is being loaded directly into a car

Bureau of Mines' Contributions to Technology of Sand and Gravel Industry

Reviewed by Edmund Shaw

A SERIES of reports by J. R. Thoenen on sand and gravel, from the prospecting stage to the delivered stage, is being issued by the U. S. Bureau of Mines in the form of Information Circulars. The first five have been received and are abstracted within this limited article, and abstracts of the following circulars will appear in subsequent issues of ROCK PRODUCTS. The individual circulars are ably and well written presentations of the subjects covered, in great detail, with definitions, illustrations and numerous helpful charts.

Prospecting and Exploration

"Prospecting and Exploration for Sand and Gravel" has been issued by the U. S. Bureau of Mines as Information Circular 6668. It is timely, too, as the sand and gravel industry is now being decentralized because the demand is mainly for country highways. As a result, numerous small and temporary plants are being erected and deposits are being developed near the work.

About a fourth of this report is given to the geology of sand and gravel deposits, with due emphasis being placed on the necessity of a knowledge of geology for the interpretation of the results of drilling, test pitting and geophysical surveys in the estimation of the value of a deposit.

Only five types of sand and gravel formations are recognized; residual, fluvial, marine and lake, glacial, and glaciofluvial. A table gives for each of these the sites where found, the structure, character of the fine and coarse material and relations to the underlying strata; and further on, these are subdivided and explained in greater detail in easily understood terms. The definitions of silt, sand, gravel, cobbles and boulders could well be universally adopted. Briefly, silt is defined as all through 200-mesh; sand is from 200-mesh to ¼-in.; gravel is from ¼-in. to 3½-in.; cobbles from 3½-in. to 10-in.; and boulders are anything bigger than cobbles.

The first step in exploring a deposit to determine its size, shape and value, Mr. Thoenen says, is to secure a topographical map of the area (the reviewer has known this to be overlooked and an expensive survey made to take its place). The test pits that are to be put down are located on the map, and knowledge of the topography is necessary to make up the sections which will later mean so much to the operator. The exploration methods discussed are solid rod, pipe with cutting edge, earth-auger, channel and angle, orange peel bucket in casing, churn drill, test pit, and various combinations of these. They are discussed to show the conditions under which they can be used, the advantages of each, and the cost. Mr. Thoenen believes that geophysical methods have a place in commercial prospecting and will prove especially valuable in locating deposits which do not show on the surface.

The recommended plan of exploration is to sink test pits at rather wide intervals and put pipe or drill holes between them. These will serve to spot changes in the deposit, such as the presence of clay lenses; and other test pits or drill holes may be sunk wherever such changes occur, to show their nature and extent. This method was used in the example given of the prospecting and exploration of a deposit in detail.

The sampling of the deposit and the investigation of the samples are well discussed. All test-pitting and drilling is not worth much if the sampling and the testing of the samples are not well done. The success or failure of the plant can lie in such little matters, slight errors in testing often leading to expensive changes in plant design and equipment. Simple tests are given for determining specific gravity, absorption, percentages of organic impurities, as clay, silt, and unsound and friable and soft particles; and, of course, the percentages of the different sized materials as shown by the sieve test. Some A. S. T. M. methods are recommended, especially for the more accurate determinations.

The last few pages of the report describe the application of methods to different types of deposits. The actual experience of eight large companies is summarized, with costs where these could be ascertained.

Development

Development (Information Circular 6689) is used in its broader sense and includes the preliminary study and planning in order to show the interrelation between the process steps and their effect on the ultimate plan which fixes the method of development to be followed.

The factors affecting development are the economic features, physical characteristics of the deposit, the character and thickness of the overburden, physical characteristics of the material, thickness of the deposit, the disposal of waste, the plant capacity, the capital available, treatment processes, delivery of material, washing and the elimination of impurities. A deposit may be such as to allow production of a suitable material cheaply and yet be inaccessible for economic delivery to markets, and vice versa; another deposit may be within reach of an attractive market but the material cannot be economically produced.

If the deposit is elevated above the surrounding land surface, it will require a different plan of operation than a deposit below the surface. The proximity of the permanent ground water level will largely determine the method of development of subsurface pits. The thickness of the overburden may prove to be such a problem as to mean success or failure of the venture, or it may be inconsequential. Stripping may be done periodically or concurrently with production. The material contained in sand and gravel deposits varies considerably. An excess of boulders may necessitate crushing, while the presence of clay may mean washing. Thick deposits may necessitate working in more than one bench.

In developing a deposit, dumping space must be allocated where it will cause a minimum of inconvenience. The quantity of material which must be handled daily has probably the most profound effect on the development of the deposit. This factor will determine the amount of stripping required and the equipment needed to handle the material. Surface topography will largely determine the method that will be used to deliver the material to the plant.

According to Mr. Thoenen, a second purpose of development is the planning and arrangement of operations so as to require the minimum expenditure of money, labor and power. In any well coördinated plan of development, the relation of the excavation site to the plant location, and of the treatment methods to excavation methods must be considered.

Considerable space in the paper is devoted to development methods and their application to various types of deposits. The three types of deposits discussed are bank, pit and marine, there being wet and dry pit deposits, and river, lake and ocean marine de-

posits. General and detailed plans of stripping overburden and rendering the gravel are shown and illustrated. Various deposit conditions and methods of operation are discussed, with examples of how calculations per cubic yard are arrived at mathematically. The report concludes with examples of how certain sand and gravel companies operate and how they arrive at the method selected.

Sand and Gravel Excavation—Part I—Digging Equipment

Information Circular 6798 was written by Mr. Thoenen to present a study of problems arising in the excavation of sand and gravel and their delivery to the treatment plant. The use of the power shovel, the dragline excavator and the excavator crane comes in for considerable discussion.

The presence or absence of a market should be the controlling factor in determining whether there shall or shall not be excavation by any method. A market survey of the consumers' requirements is the first essential step in determining the method of excavation. The method of excavation is governed then by the type of deposit, and is influenced further by the type of machinery to be used. An example given is that bank deposits are dry excavations but may be operated by power shovels, dragline excavators, power scrapers, or slackline cableway excavators or by hydraulicking. Dry pits may employ the same types of equipment as banks, but wet pits will not use the power shovel except for stripping, or removing an upper bench. The dragline, scraper and slackline excavator may be used in wet pits as well as the pump, clamshell or ladder dredge, according to the writer. Marine deposits may employ power scrapers, slackline excavators or any type of dredge.

Haulage equipment may affect the method of excavation to some extent, inasmuch as the function of this equipment is to serve excavating equipment. Mobile haulage units such as locomotives and cars, motor trucks, and portable belt conveyors are used to serve power shovels and dragline excavators in banks and dry pits. At wet pits, trucks and industrial railways are used for hauling.

The suitability of excavating equipment to fulfill the needs of the method of excavation, according to Mr. Thoenen, depends upon the capacity of the unit, the limitations inherent in its construction, and its requirements in the way of service equipment. During the short working season production must exceed consumption, and the surplus must be stock-piled.

The power shovel is limited to dry operation and is largely confined to material lying above the working floor. While the dragline is slower, it can work below the floor. The power scraper and slackline cableway excavator have a much greater horizontal and vertical range than either of the other two. The latter two machines act both as excavators and transportation units, while the others must have transportation service.

A table is shown illustrating the fact that the major production of sand and gravel is excavated by mechanical equipment. Fifty per cent of the country's production in sand and gravel in 1929 was produced from dry excavations. The table shows that power shovels accounted for approximately 30% of the total production.

Each of the types of equipment is subject to limitations in its use. The power shovel is limited in its vertical or lateral reach by the length and angle of the boom and the length of the dipper stock. The capacity of a power shovel depends upon the size of the dipper; the type and application of the source of power; the hoisting, crowding, swinging, and traveling speeds; the speed of swing acceleration and deceleration; the type of mounting and the ease of operation. Numerous tables and calculations of capacities are included in the report by the author.

The dragline excavator is limited to a height equal to the bucket clearance when swung from the end of the boom. The lateral or horizontal reach is limited by the length and angle of the boom. The best pitch angle for ordinary purposes, according to Mr. Thoenen, is from 30 deg. to 37 deg. The vertical depth is limited by the length of the boom, the angle of repose of the material dug, and the length of the hoist cable. A table is included showing working ranges, horsepowers of various sizes of dragline excavators, time cycles for an average swing of 90 deg., and ranges of dragline capacities.

Excavator cranes, according to the author, are not often used for digging gravel. They must depend upon the weight of the bucket to penetrate and dig the gravel. The orange-peel bucket is best suited because of its pointed cutting edges. The working capacity is measured by the amount of material it can dig and load in a given time. When used for wet pit or marine excavation, the crane is commonly mounted on a floating scow and, as such, is discussed in the circular covering dredges.

Sand and Gravel Excavation—Part II—Conveying Excavators

Information Circular 6814 is a study of excavation by use of the power scraper, slackline cableway excavator, and hydraulic giant.

The power scraper consists of a head and a tail mast or tower, between which the load and return cables are stretched. At the dumping end the head mast may be a single timber or steel structure set on a permanent foundation. The author states that the head mast may also be built into and form a part of the treatment plant, or that it might be self-propelled. At the loading or tail end, the structure may be either a simple low mast guyed to anchorages set in the ground, or might be movable on tracks. One man operates the scraper by manipulating the hoist drums, which are powered by steam, gasoline, Diesel or electric motor. The author describes a few variations from this set-up.

All power scrapers are bottomless, some being rectangular, semi-circular, and crescent shaped. Some have no top covering, some have a partial top, and others are completely covered. They all depend on the weight and design of the bucket for penetration and digging. The author states that the theoretical capacity depends upon the size of the scraper, the speed of load and pull-back cables, and the distance between digging point and dump. The working capacity depends upon all these elements and others such as weather conditions, the design and weight of the scraper, the location and efficiency of the operator, etc. Tables have been compiled showing working ranges, horsepowers and power plants necessary for given power scrapers.

The slackline cableway excavator is described as a development of the power scraper in which the addition of a track cable and trolley to the power scraper has speeded up the time required to return the empty scraper to the pit. The main difference in operation is that the bucket when loaded is elevated and hauled while suspended from a cable. The slackline excavator operates from the surface of the ground, and for this reason may be used for either dry or wet excavation. The horizontal reach of this machine is tremendous, according to the author, and may be as high as 2000 ft. in the larger buckets. The depth below surface to which it can reach will vary with the topography, but may be approximated at 20 to 25% of the total span. The height above surface to which the slackline will elevate its bucket for dumping depends upon the height of the head tower and factors affecting that height. The author has included a table showing the working ranges for different sized buckets and for various spans, and tables for working capacities.

The last half of the report has been turned over to a discussion of the hydraulic giant and its method of use. The author starts out with definitions

and discussions which would be beneficial to the person having no understanding of the subject. In hydraulicking the water is conducted to the bank through pipes under medium to high pressures and is used to undercut and cave the banks. Pressure can be obtained either by tapping a source at a higher elevation or by pumping. Hydraulicking requires the use of hydraulic giants, which are described as being in general like the nozzles on the end of fire hoses.

Excavation is accomplished by directing the stream of water against the foot of the gravel bank and undercutting it. Considerable space is devoted to the variations in pressure necessary under varying conditions. The head at which the water is supplied to giants ranges commonly from 50 to 400 ft. The writer has supplied tables showing the calculated velocity and discharges for ditches of various cross section and slope, and has gone at length into the computation of these discharges and into the calculation of flow of water through hydraulic giants.

Sand and Gravel Excavation—Part III—Dredges

Information Circular 6826 describes the use of various types of dredges. Plans and layout of simple pump dredges are shown and described. It is emphasized that the dredge design must fit the conditions; for example an artificially constructed wet pit would require a different type of dredge from one to work on a river subjected to swift currents.

In the case of pumping, or hydraulic, dredges, the author emphasizes the need of a knowledge of hydraulics if the best efficiency is to be obtained; he explains some of the fundamentals in simple language. He gives a table of the friction head for sand, gravel and water mixtures, which should be particularly helpful as most hydraulic tables of a similar nature are for clear water only. Other tables of value to operators are given. Of all the equipment used for excavating and transporting sand and gravel, the average operator probably knows least about dredge pumps, and the data in this report should prove very helpful.

Other types of dredge, the clam-shell bucket type, the ladder dredge and the dipper dredge are similar in construction and operation to other types of excavating equipment and are not dealt with so exhaustively. The chief difference is in the method of placing and holding them, by spuds or cable lines.

No references are given, so it is assumed that much of the material in this report is original. This report was issued in March, 1935.

Sand and Gravel Excavation—Part IV—Car Haulage

Information Circular 6856 discusses haulage equipment in general, particularly the use of industrial cars with locomotives or hoists as the motive power.

Haulage equipment is grouped into three classes: (1) that used to receive overburden and transfer it to the waste dump; (2) that used to receive sand and gravel from the digging unit and transfer it to the treatment plant; and (3) that used to receive sand and gravel from the plant and transfer it to storage, to return the aggregate from storage for further treatment or to recover it from storage and transfer it to shipping equipment.

Emphasis is placed upon the dependence of excavating units upon the haulage unit for efficient operation. Mention is made that the selection of the proper haulage unit depends upon the type of excavator, the mining method, the surface topography, the character of the materials, the available power and the experience and preference of the operator; and the types of haulage units to be used with certain excavators are tabulated.

Advantages and disadvantages of industrial cars are discussed at great length, the main advantage being the wide flexibility in the capacity of the system, which is offset by high maintenance costs.

Considerable space is turned over to a technical discussion of the types and sizes of locomotives to be used for varying conditions. Ordinarily in sand and gravel pits, locomotive speed is sacrificed for power. Tables show the relation between tie spacing and rail and locomotive weight, and the coefficient of adhesion between wheels and rails for conditions of snow, sleet, etc., on the rails.

The method of calculating the requirements for a locomotive and car-haulage system is worked out in detail by Mr. Thoenen for a hypothetical example, with tables developed to show necessary train-time cycles to give a required output.

The engine plane, gravity plane, tail-rope and endless-rope systems of haulage are described, with structural limitations for each and a description of the types of service equipment required.

Remote-control haulage systems, according to the author, have never been used in sand and gravel pits but have been successfully applied in rock quarries and are fundamentally adaptable to sand and gravel pits as well.

The system consists of the operation by remote control of a number of self-propelled load-bearing cars by one man from a centrally located observation tower. The system is powered by electricity, furnished through a third rail, with the haulage route in sections, any one or all of which can be energized at one time. These systems have a high first cost, but operating costs for large production have been reported to be very low.

Sand and Gravel Excavation—Part V—Haulage

Information Circular 6875 takes up the study of motor-truck haulage, conveyor belt haulage and the use of pumps and pipe lines, barges and towboats and aerial trams.

According to Mr. Thoenen, some operators readily admit an increase in both labor and total haulage operating costs, where trucks have displaced locomotives and cars, but point to other worthwhile advantages. In other instances, haulage costs have been reduced by the use of trucks.

The reason for the increased use of trucks can be summed up in the one word "flexibility." One of the advantages mentioned in favor of trucks is that they have more power per ton of load, accelerate more quickly and are capable of shorter time cycles on short hauls. It is pointed out that on long hauls the locomotive system will usually handle a larger tonnage per unit of labor and time, even though the speed may be slower, and that on hauls of several miles locomotive speeds may actually surpass those of trucks. Types of bodies and structural limitations are discussed, along with capacities and time cycles. Conveyor-belt haulage is discussed for several cases along with structural limitations. Tables and graphs indicate the minimum and maximum plies for troughed belts for various widths and material sizes, recommended maximum sizes of lumps for belt-conveyor haulage, the spacing of rolls for weight requirements, minimum pulley diameters, maximum recommended speeds, etc. Continuous and irregular methods of feeding the belt are described.

Under the heading of "Pumps and Pipe Lines," Mr. Thoenen describes the limitations in pumping sand and gravel, power required to pump a given distance, the effect of pumping particles creating high internal friction, auxiliary equipment, and other necessary considerations for this type of operation, with tables including capacities of pump and pipe-line systems in tons per hour.

The use of towboats and barges is described for both intraplant haulage and interplant haulage with a discussion of structural limitations and an illustrated description of the hopper-type, semi-hopper type, flush-deck and self-unloading barges.

The circular is concluded with a de-

scription of six types of aerial tramway haulage systems. The author points out that the great advantage of the aerial tram over other systems is that it requires no prepared roadway on the ground. This avoids interference with surface operations along the right-of-way and traffic at intersections with highways.

The aerial tram may be used for either short intraplant service or for long interplant haulage, compares favorably with other types of haulage in installation cost over level topography and ordinarily has considerable advantage in this respect in rugged country.

Sand and Gravel Excavation—Part VI—Summary

Information Circular 6879 was recently issued to complete the discussion of excavating problems. It describes the application of the various types of equipment mentioned in the previous circulars to the different types of sand and gravel deposits and contains a reference bibliography.

The type of deposit and the type of equipment used are mentioned as the two major factors governing the selection of a method to be used in mining a sand and gravel deposit. Inasmuch as two operators may operate the same type of deposit successfully by entirely different mining methods, no definite type of equipment can be linked up with any one type of deposit, so an attempt is made to show what methods are applicable to the several types of deposits and to point out their advantages and disadvantages.

For the purpose of discussion the author has classified sand and gravel by types as bank, pit and marine and each type is subdivided. The problem of selecting the proper method for a given deposit is complicated by the overburden covering most bank and pit deposits and some marine deposits. Thin overburden may be removed in the process of mining the gravel, and thick overburden is usually removed separately. It may be removed by use of the same equipment or may require entirely different equipment.

Methods of working bank deposits are described for both the bottom benching and top benching types, along with a discussion of haulage methods. Pit deposit mining is discussed for dry and wet pits.

The author emphasizes the importance of observing the water level in test pits and also the rapidity with which they fill to that level after having been pumped dry, to accurately determine the subsurface flow before choosing a method of operation.

Marine deposits are discussed under the headings of river, lake and ocean deposits. Each of these types is necessarily worked by some type of dredge, several of which are described.

Mining of river beds and small islands by top benching with power scrapers or slackline cableways located on the river bank and by dredges is discussed. The use of draglines, because of their limited range, is not advised, unless an island deposit is large, making the operation approach wet pit mining. Dredging methods are important, according to the author, because the dredge can be alternated between several bars according to the type of material needed for market. Hydraulic and grapple dredges are recommended as being better suited for selective mining, and ladder and dipper dredges for systematic mining.

Types of river-bed haulage are described and methods of mining lake beds and ocean deposits. Tables point out the costs of equipment for all cases.

The author, in conclusion, acknowledges the help received from nationally known engineers and operators in the field, thanking them for their assistance in reading the manuscript, criticizing and making necessary corrections and additions.

Cone Method for Determining Absorption of Sand

THE United States Bureau of Public Roads monthly, *Public Roads*, for August, 1936, contains an 8-page article on a method of determining the absorption of water by sand, which has been developed in the laboratory of the Bureau. The first portion reviews the methods now in use, the kerosene method, the method of Pearson, as developed into the A.S.T.M. tentative standard method, C 95-33 T, and the method of visual inspection, which is simply telling when the sand is dry on the surface by noting when it changes its color. An investigation showed all these to have the defect of leaving the end point to the judgment of the operator, and it was evident that a measurable end point was needed.

The end point chosen was the dryness at which a cone of sand formed in a 70 deg. truncated cone (like a little slump cone) would begin to slump. Cones with angles of 45 deg. to 60 deg. had sides too close to the angle of repose to give definite slumps. An 80 deg. cone gave a definite slump, but the microscope showed free water on the grains. The 70 deg. cone gave a definite slump with no free water and was therefore adopted.

The method of testing, somewhat condensed from the original, is as follows: A 1000-gram sample is placed in a pan of water and soaked for three hours, then drained and dried in a gentle current of warm air, with frequent stirring. When it appears to be approaching a surface dry condition, tests with the cone are started. The cone is 1½-in. at top, 3½-in. at bottom and 2½-in. high. It is filled at the top and tamped lightly 25 times with a rod weighing 12 oz., having a 1-in. diam. flat face. The cone is lifted vertically and if the sand does not slump, drying is continued until the sand does slump when the cone is lifted.

To insure that the sand has not been dried too much, a few drops of water are mixed with it and the test is repeated. The cone will not slump if free water is present. The weight of the cone is then determined, the sample dried to constant weight, and the percentage of moisture is calculated from these weights. Important points in the test are, the sample should be frequently stirred while drying to obtain uniform drying; the first trial for slump should find the sample with no free moisture present; and successive tests should be made at shorter and shorter intervals. One-half minute intervals are used in the Bureau's laboratory toward the close.

The article gives many tables of check work done by 12 different laboratories in different parts of the country. Six sands from different states, four silicious and two calcarious, were tested. The cone method was checked by the kerosene method, visual inspection and A.S.T.M. method C 95-33 T. The range was from 0.2% to almost 2% absorbtion. Visual inspection and the A.S.T.M. method checked closely on all samples. The cone method gave slightly higher results, and the kerosene method gave poor checks and so much lower results as to indicate that one of the other methods was much to be preferred.

Damage Suits Follow Loss of Sand Ship

LEATHAM SMITH-PUTNAM NAVIGATION Co., Chicago, Ill., owners of the *Material Service*, the Diesel-powered sand and gravel cargo ship which sank in Lake Michigan, July 29, with the loss of 15 lives, has been sued for $200,000 damages by the administrator of the estates of seven members of the crew. The ship was under charter to the Material Service Corp., Chicago, sand and gravel producer; hence its name.

Resumes Production

UTAH STATE ROCK ASPHALT PLANT, Vernal, Utah, resumed operation the middle of October after being idle since spring. It is expected to operate through the winter to supply 7000 tons for a seven-mile pavement in Uintah county.

Los Angeles Rattler Test

"The Equipment and Procedure Are Simple and Results Are Consistent. . . . The Results Are Concordant with Field Conditions as Represented by Circular Test Track"

By L. J. Rothgery,
Engineering Experiment Station,
Michigan State College, East Lansing, Mich.

LABORATORY TESTS of aggregates in general have been somewhat unsatisfactory. Interpretation of test results still left a question in the engineer's mind as to the basis of rejection or acceptance. Aggregate specifications can be and are written to designate materials obviously satisfactory. However, to meet these has meant in many cases long hauls, added transportation costs, and frequently costly preparation on the part of producers.

Probably no one in the business of road building wants to let down the bars to materials known to give inferior results. Many aggregates which fall short of present specification requirements have proved in the past to give excellent results in both bituminous and portland cement mixtures. In connection with the use of these materials both field and laboratory engineers might pause and inquire into some of the accepted criteria upon which we have previously based our standards.

Durability

The forces of disintegration may be placed in two divisions: (1) The natural forces, or those caused by changes in moisture and in temperature, and (2) the physical forces, or crushing under loads and the abrasive action of construction operation and of subsequent traffic.

The so-called "durability test", while it is questioned by some engineers, has proved to be of great value in determining the quality of resistance to moisture and temperature changes. At least, it is a means comparing aggregates and has been found to be fairly consistent.

Acceptance of coarse aggregates has been based largely on the results of the toughness test and the Deval abrasion test. Users are losing confidence in the toughness test for the reason that very slight differences in the condition of the apparatus makes a very considerable difference in results. For the same reason one laboratory finds it difficult to check with another on a test of the same material.

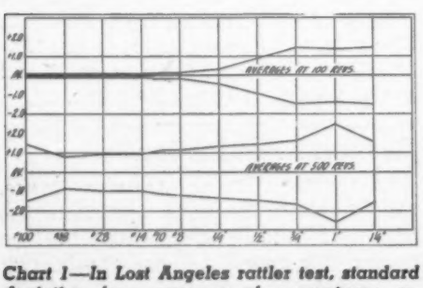


Chart 1—In Lost Angeles rattler test, standard deviation from average of percentages retained on various sieve sizes

The Deval abrasion test is losing favor because:

(1) It is slow and ponderous, requiring more than 5½ hrs. running time and a similar length of time for drying the washed sample.

(2) Three classes of material — crushed rock, uncrushed gravel and slag—the three commonly used coarse aggregates are tested in different ways, so that it is extremely difficult to compare one with another.

(3) Its action during test is one of internal abrasion and allows for no measurement of the destructive action of other forces exerted on the material in use.

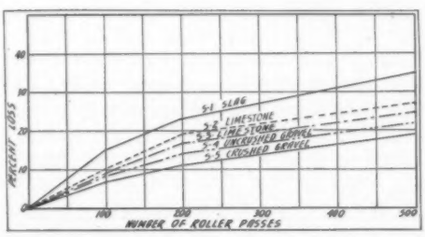


Chart 2—Test track roller abrasion curve for five different aggregates, showing loss over 10-mesh sieve at 100-pass intervals. Compare with chart 3

(4) In the relatively small containers used in the Deval Test the accumulation of dust appears to serve as a cushion against the abrasive action of the charge.

Unquestionably the answer to our aggregate problems will eventually be found in the observation of these materials in actual service. The practice of job experimentation is positive, and very definite deductions can be drawn from observations; but unless the variables can be narrowed down to practical limits, this experimentation is too long drawn out and costly. This narrowing down of variables has been possible only by establishing definite criteria of quality of materials, based upon experience and by identifying and evaluating this quality in terms of such tests as have been accepted to date.

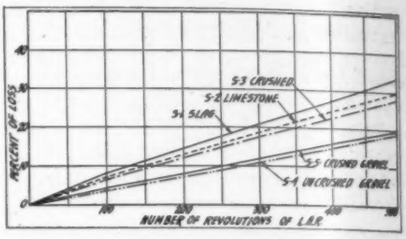


Chart 3—Los Angeles rattler curves for five aggregates, showing loss over 10-mesh sieve at 100-revolution intervals

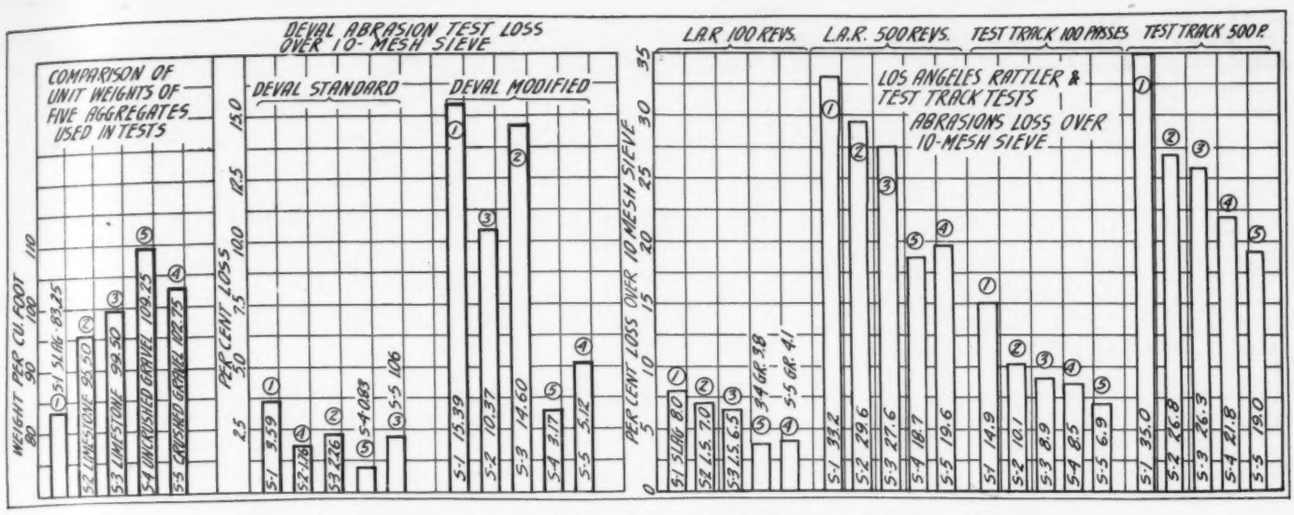
The circular test track offers extremely interesting possibilities as a test of both aggregate and mixture. Field conditions can be approximated; the action on the materials is an accelerated one; and rather rigid control of temperature, moisture, and the type and degree of loading is possible. However, this is more of a proving machine than a testing machine. There is also difficulty in the accurate recovery of samples at various phases during test runs.

Rattler Test

The Los Angeles rattler, with which all laboratories are now familiar at least in name, seems to show great possibilities as an acceptance test for coarse aggregates.

This machine is essentially a drum of the same dimensions as the commonly used brick rattler, namely 28 in. in diameter and 20 in. long. The Los Angeles drum is made dust-tight and has one 4-in. shelf for the entire length on the inside. This shelf serves to pick up the entire charge and drop it during each revolution. The speed is the same as in the Deval test, 30 r.p.m. The aggregate charge is 5000 grams, and to this is added a shot charge of 5000 grams.

The original Los Angeles specifications called for a short charge of cast iron cubes with the corners and edges rounded. Our laboratory has followed the Bureau of Public Roads recommendation of using the 1⅞-in. cast-iron spherical shot, which were on hand for



Charts 4 and 5—Comparison of abrasion losses in Deval and Los Angeles rattler tests

use in the brick rattler and the modified Deval test. A little selecting resulted in a combination of 12 balls that weighed a total of 5000 grams ± 5 grams.

Our rattler was built in all essential details to the California specifications, except that the 4-in. shelf was placed as a part of the removable gate, rather than in the drum proper. This was an aid in the recovery of the sample and in thorough cleaning of the drum.

During the winter 1934-5 some aggregate studies were started in coöperation with the Research and Testing Division of the Michigan State Highway Department. Samples of aggregates were collected from most of the major commercial sources and physical studies made which might aid in the preparation of new specifications.

Since that time a number of public works representatives and material producers have visited the laboratory, and in each case the question arose as to the efficacy of the Los Angeles rattler. Several of these representatives contemplated building machines for their own laboratories, if it proved to be as consistent and efficient as short use seemed to indicate. With these questions in mind it was decided to make comparative aggregate tests with the machine itself as the point of interest.

Test Samples

To gain a fair idea of the consistence of results obtainable with the rattler, 20 samples of a certain medium limestone were made up and run on the Los Angeles machine. Instead of simply determining the 10-mesh loss on the samples as taken from the machine, the entire sample was sieved on the following sizes: 1¼-in., 1-in., ¾-in., ½-in., ¼-in., round openings, and the No. 10 (0.065 in.), Nos. 8, 14, 28, 48 and 100 sieves. The reasons for selecting this particular group were as follows:

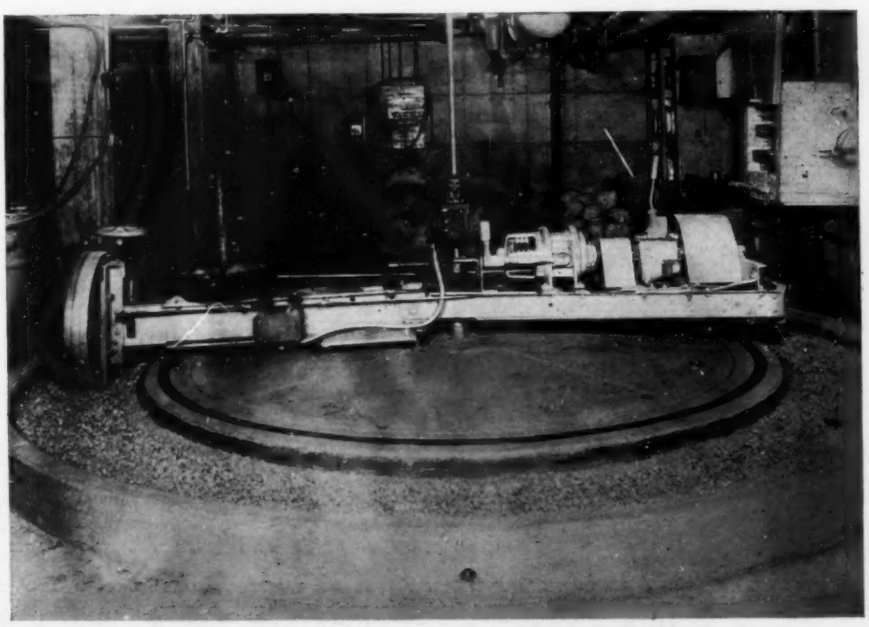
(1) The accepted 10-mesh was present in the group.

(2) The round opening sizes above the ¼-in. were those used in comparative tests by the Bureau of Public Roads, and it was these sizes upon which the grading of the original sample was based.

(3) It was felt that there might be a more intelligible method of reporting abrasion results than by the loss over some particular size sieve. It seemed that it might be of value to learn by the test what was happening to the various sizes of the materials, after being acted upon by the destructive forces of the machine. It might mean more to report the results on a basis of reduction in grading modulus (Abrams). Hence the selection of those particular sieve sizes below the No. 10. The Tyler sizes for the larger fractions could easily be taken off the conversion chart after plotting.

The material taken from the Rattler after each run was hand-sieved to the ¼-in. size, the finer fractions were run 12 minutes in the Ro-tap. It has been observed that mechanical sieving of the larger sizes causes some discrepancies in results due to abrasive loss in the sieves. Mechanical sieving of the smaller sizes directly after hand sieving of the same sample showed a difference so slight that it did not affect the plotting of results.

The question of washing the sample over the various sieves as compared with dry sieving should also be discussed. Either practice if accepted



Circular test track and car used in making comparative abrasion tests

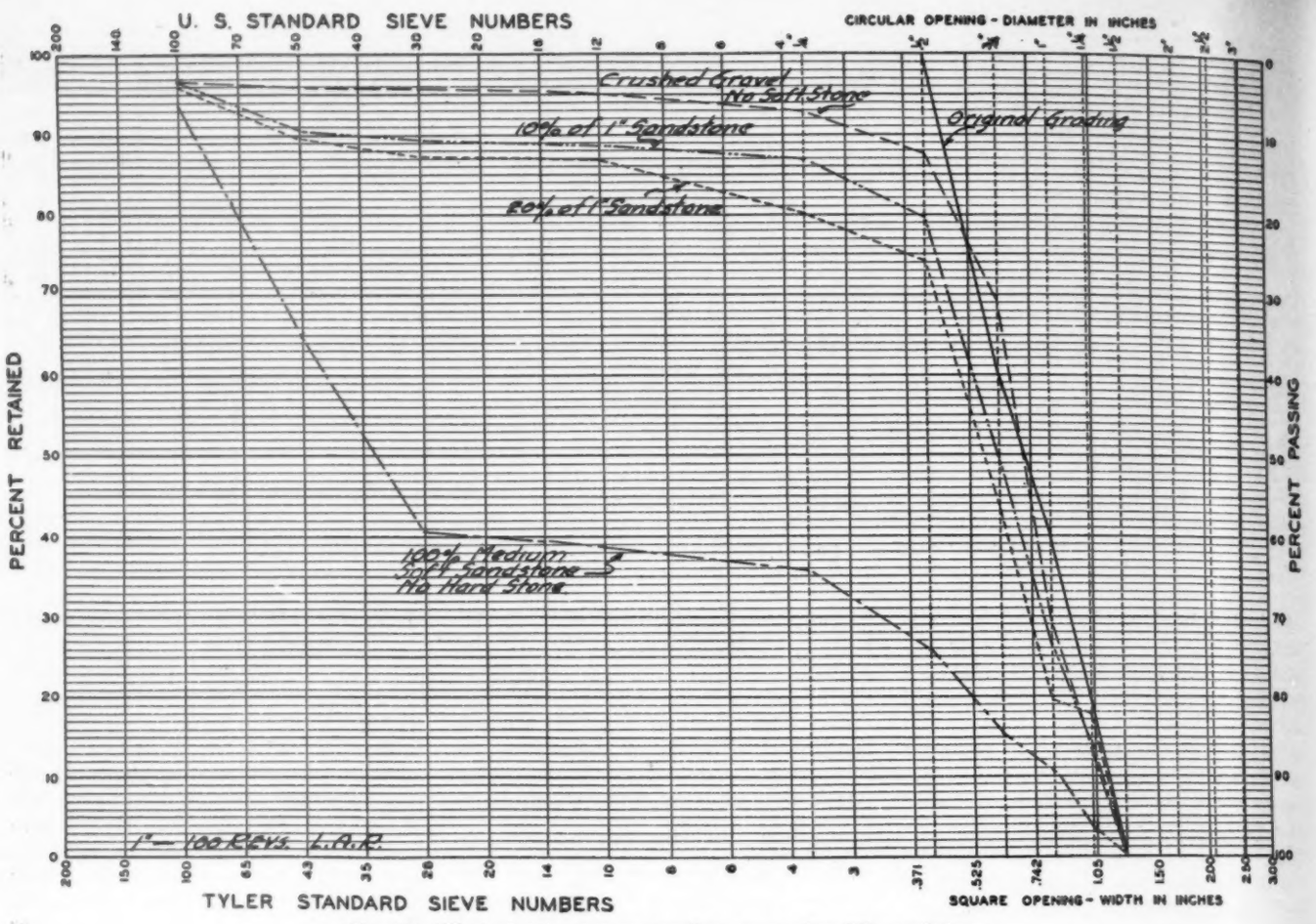


Chart 6—Effect of soft stone on grading curve after 100 revolutions

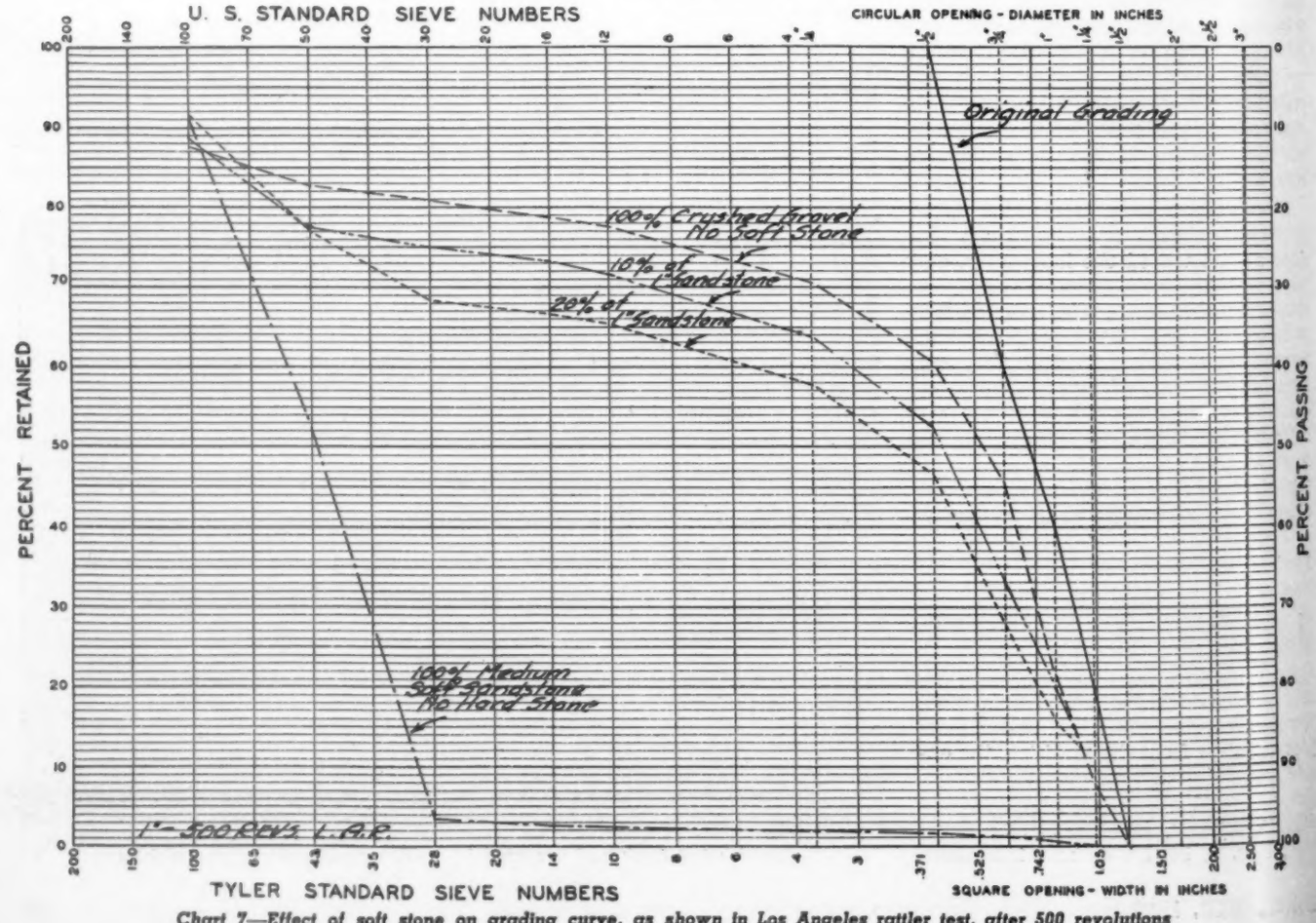


Chart 7—Effect of soft stone on grading curve, as shown in Los Angeles rattler test, after 500 revolutions

should be consistent. This difference again was not sufficient to affect the plotting. Consequently the results as indicated in these charts are based upon dry sieving.

With the 20 samples run, the results were tabulated and curves of the standard deviation from average plotted as shown in Chart 1. It should be noted that the greatest deviation occurs in the larger sieve sizes, probably due to the varying amounts of material of a size just barely retainable on the given sieve.

The standard deviation at the No. 10 sieve was plus or minus 1.12% at 500 revolutions. Only three of the sieve sizes showed deviations less than this amount, and these occurring on sizes smaller than the No. 10. If the reporting of test results is to be based on the loss over some single size sieve, then a study of the curves of both the 100 and 500 revolution results seems to indicate that the loss at the No. 10 sieve is as good a point as any.

The point brought out by these tests was that the results were remarkably consistent, that a laboratory could expect results to repeat on additional runs of the same material and that very closely similar results can be expected from different laboratories on a given material.

Circular Track Tests

Aggregate users and producers alike have been inquiring into our established aggregate tests with the question in their minds as to what these test results mean in terms of actual field behavior. In other words, are they of practical value? Do they tell us what we can expect of a given material when used in a road surface? Some of the established tests have been of inestimable value in this respect.

To answer these questions in connection with the Los Angeles rattler tests it was decided to make comparative runs of each material on the circular test track. This apparatus seems to simulate very closely all the conditions of live loading as encountered in field practices and allows for fairly close control of these conditions and acceleration of results. The illustration shows the construction of the track and test car.

As an accelerated test the material was subjected to the action of the roller for stated numbers of passes. The roller is made up of six sections each having a 1½-in. width of face and rolling differentially. The test car is loaded to give a weight on the roller wheel of 200 lb. per in. of width. The track width was narrowed to 14 in. with a false curb to avoid lateral displacement of the aggregate.

Sample recoveries were made after each 100 passes of the roller up to 500 and the loss over the No. 10 sieve determined.

It will be noticed on Chart 2 that the crushed gravel sample No. S-5 showed the least loss and this curve varies in relative position as compared with the rattler. The reason for this was that the sample became consolidated with very few roller passes and the abrasive action of contacting faces reduced. This action is not possible in the rattler as all faces of the material are exposed and a fair test of the abrasive resistance of the stone can be made regardless of the shape of the particles. Other than this deviation the curves of results in the rattler as shown in Chart 3 appear in the same relative position.

Sample S-1, a blast furnace slag showed the greatest abrasive loss of the materials in this series, but was still within tentative specification limits of 35%. This material was followed in order by limestone samples S-2 and S-3, crushed gravel S-5, and uncrushed gravel S-4. The next two charts, 4 and 5, show these test results more strikingly. In these charts a comparison is made of the results obtained in the Deval apparatus, both standard and modified methods, the Los Angeles rattler and the test track. It seems reasonable that the unit weight of the materials tested should bear some relationship to its abrasive resistance, provided that the grading of the samples is the same. This premise is borne out in the results of both the test track and Los Angeles rattler tests. The Deval results were concordant in the case of samples S-1 and S-5 which were the extremes as to unit weight.

Soft Stone

One of the major difficulties in the use of glacial gravels as coarse aggregate in work of any importance is the presence of soft stone. It is true that the use of the recently perfected so-called disintegrators have been successful in reducing the percentage of these deleterious materials to some extent. However, it is often the case that in applying these methods to the extent of reducing soft stone to the specification limits there is an accompanying reduction in the size of the acceptable material. This, of course, makes for a lesser yield of the larger sizes and consequent higher plant cost.

Experience shows that there is no question as to the effect of the Los Angeles rattler on these soft particles. The possibilities of the rattler in making soft stone determinations were mentioned recently by investigators in the laboratories of the Bureau of Public Roads.

This phase was investigated by using as a basic material a crushed gravel of unquestionable quality and free from soft particles. The 10 mesh loss at 100 revolutions was 5% and at 500 revolutions was 22.5%.

This material was split into four sizes in accordance with previous tests and recombined so that each sample contained 20% of 1¼-in., 20% of 1-in., 20% of ¾-in. and 40% of ½-in. sizes.

As a soft stone adulterant a medium sandstone was selected because of its uniformity. The 10-mesh loss on the sandstane at 100 revolutions was about 61.5% and at 500 revolutions about 97.5%.

This soft material was then used to replace first half, then the entire, percentage of each size in the grading of the hard material. In this study the loss over any individual sieve size, such as the 10-mesh, would offer incomplete information, so again the entire grading was plotted for analysis.

The hard material was first run in the rattler for 100 and 500 revolutions. Following this the sandstone itself was run. Base curves were then drawn of each of these at 100 and 500 revolutions. It was reasonable to suppose that a sample of the hard stone which contained some percentage of sandstone at some place in its grading would, when run in the rattler at 100 revolutions, produce a curve which would fall between those of the hard and soft stone at 100 revolutions. The curves in charts 6 and 7 show these relationships for the 1-in. size soft stone, and are typical of the charts for each of the other sizes. So far no definite conclusions have been drawn. There is room for considerable study in this connection and it is hoped that out of group discussion and comment some satisfactory solution will be found.

Conclusions

In conclusion it appears that the Los Angeles rattler type of tests is important and warrants considerable attention at this time. The equipment and the procedure are simple and the results are consistent. No elaborate preparation of the sample is needed. The aggregates are tested more nearly as they are used in practice. The time required for the test is short so that a fairly exhaustive study of a group of materials may be made in days when heretofore it required weeks. The results are concordant with field conditions as represented by the circular test track.

It is felt, too, that there is still a possibility of learning something of soft stone conditions in the aggregate from rattler tests.

What the Employer Should Know About Silicosis*

By Theodore C. Waters
Mullikin, Stockbridge & Waters, Baltimore, Md.

PRIOR to the adoption of the workmen's compensation acts by our several state legislatures, an employe injured in the course of his employment could only recover from his employer for those injuries which could be attributed to the negligence of his employer.

While liable for his own negligence, the employer was not liable for the dangers of the employment, a risk that was assumed by the employe. The contributory negligence of the employe and the negligence of his own fellow servants were similarly available as defenses to the employer. Therefore, in cases involving industrial disputes, as a result of this legal status, employes resorted to actions at common law to obtain compensation for injuries based upon the alleged negligence of the employer.

The main purpose of the authors of the workmen's compensation acts enacted by our several state legislatures was to make the remedy granted thereby the exclusive remedy for injuries suffered by employes during the course of their employment. These acts stripped the employer of his common law defenses, including:

1. Failure to prove the employer's negligence.
2. Assumption of risk by the employer.
3. Contributory negligence of the employe and negligence of his fellow servants.

In other words, the compensation acts made the employers insurers of the safety of their employes against accidental injuries. On the other hand, the compensation acts deprived the employe of his right of common law action for accidental injuries sustained by him in the course of his employment. We must bear in mind, however, that the workmen's compensation acts did not purport to cover occupational disease injuries, but solely accidental injuries, that is, those injuries which occurred at a specific place, at a certain time, and which could be ascertained and determined coincidentally with the infliction of the injury.

Forty-six states and the District of Columbia have enacted workmen's compensation acts, Arkansas and Mississippi alone not having such acts at the present time. Compensation acts which exclude compensation for occupational diseases, either expressly or by judicial interpretation, have been enacted in 32 states. Fourteen states and the District of Columbia have (*a*) workmen's compensation acts which include compensation for occupational diseases, either expressly or by judicial interpretation, or (*b*) specific occupational disease acts.

With respect to those courts holding that the workmen's compensation acts do not provide an exclusive remedy to an employe, whereby the employe retains his common law right of action for injuries sustained by him in the course of his employment, such ruling is based substantially upon the reason that since workmen's compensation acts were designed primarily to compensate for traumatic injuries, they replace the employer's common law liability solely for those injuries sustained by accidental means.

Therefore, with respect to those personal injuries sustained by other means, as for example, silicosis, since it is not compensable under the compensation acts, the employe still retains his common law right of action therefor, based upon the negligence of his employer. With respect to those courts holding that the workmen's compensation acts do provide exclusive remedy, such ruling is based primarily upon the language of the act and the further ruling that an employe had no common law right of action for occupational disease injury.

Legal Basis for Recovery

The usual form of declaration contains allegations that the defendant manufacturer caused the plaintiff to work in an atmosphere where silica dust existed; that the defendant knew or should have known that certain materials used by the defendant employer contained harmful or dangerous agencies of silica which were destructive to life and health in the human body; that the defendant was guilty of negligence in failing to warn the plaintiff of the danger and in failing to provide the plaintiff with a safe place in which to work or safe appliances with which to work; that thereby the silica became introduced into the plaintiff's lungs and body, causing him permanent injury.

The defense pleadings set up the defense of assumption of risk by the plaintiff, the plaintiffs' contributory negligence, the negligence of the plaintiff's fellow servants and a general denial of the allegations of negligence as charged by the plaintiff.

It is needless for me to emphasize the seriousness of this type of litigation. Class is arrayed against class. The local press in those places where the cases are tried will carry sensational headlines with respect to the trial, describing the terror of the disease and emphasizing each complaint against the manufacturer. Suits are filed, not singly, but by the dozens. The whole community wherein the industrial plant is located becomes aroused, with the attendant industrial chaos, and by the time trial day arrives, every citizen of the community is so prejudiced against the defendant that it is almost impossible to procure an impartial trial.

Need for Compensation Legislation

The ultimate solution of the problem of compensation for silicosis must be found in some type of legislation that will remove this dispute from the field of common law suits. In the same way that workmen's compensation acts eliminated such actions for accidental injuries, some legislation must be devised to eliminate such actions for occupational disease injuries.

The honest employer desires to provide compensation for those injuries occurring to his employes as a result of the industrial processes in which the employe is engaged and which are peculiar thereto. The honest employe similarly desires compensation only when he has suffered actual injury.

The nation-wide publicity that has been given to this problem has served a fortunate purpose in molding public opinion to eliminate such diseases from industry so far as engineering control thereof is capable of doing so. You and I, as citizens, recognize the fact that industry should provide for its employes a safe place in which to work, and accept this obligation imposed upon us by law.

In the second place, the problem itself is one that calls for the coöperative effort of both capital and labor. There are certain industrial processes wherein the hazard of silicosis exists, and today there are available mechanical improvements to eliminate or control this hazard. Upon capital rests the burden of the installation of such mechanical equipment as will minimize the hazard insofar as is possible. An affirmative duty of constant care is imposed upon industry to perfect its mechanical improvements for control. However, for their part, those who labor must be educated in the ways and means of pro-

* Paper read at Quarry Section Meeting, National Safety Congress, Atlantic City, N. J., October 7, 1936.

tection, to carry out the principles of good housekeeping that employers and responsible state agencies may suggest, and utilize such protective appliances that may be offered for their protection.

If employers and employes alike recognize and discharge these duties, effective results should be obtained in minimizing the hazard and controlling diseases arising therefrom. Again, with respect to compensatory legislation, occupational disease compensation should not be permitted to become health insurance; and upon industry should be imposed only those costs which compensate injuries that are peculiar to the particular industries in which the employes are engaged.

Form of Silicosis Compensation Acts

For many who have given but superficial thought to this problem, it has been somewhat easy to say that compensation for silicosis injuries should take similar form to that for accidental injuries. The vice of such thought is in our failure to recognize the essential differences between the two types of injuries, to wit—that *accidents* occur at a specific time, at a specific place, in a specific way, under a specific employer, while silicosis and other occupational disease injuries are the result of the accumulation of injurious substances over an extended period of time in different forms or types of employment and even under different employers.

Therefore, the practical administration of the thought to compensate silicosis injuries in a manner similar to accidental injuries has not proved satisfactory and some other solution must be found.

We have seen that in considering the national development of compensation acts, their original design was to cover *only* accidental injuries; in form and in methods of administration they were not designed to cover occupational diseases. It may be true that certain occupational diseases have characteristics strikingly similar to traumatic injuries, such as anthrax and lead poisoning, where the disease develops immediately after exposure and the development of the disease is rapid and becomes disabling, fatal or cured within a limited period of time.

On the other hand, there are certain forms of occupational diseases, for example, silicosis, where the injuries sustained represent the accumulation of injurious substances over an extended period of time and disablement may follow exposure to hazards under successive employers. Therefore, in considering legislation for occupational diseases, we must recognize the fact that the problem with which we propose to deal is, of necessity, different from the accidental injury problem and that the administrative provisions of such legislation must be designed especially to handle this particular problem.

I am not a professional critic of workmen's compensation laws in effect in this country, but one thing is certain, none of them is perfect. Some of their provisions are perhaps unjust, either to the employer or the employe; and, certainly, in the administration of these provisions, the human element therein may give rise to certain inequities. However, these acts were the result of the need of transferring the disputes arising between employer and employe to some state agency whereby they might be settled, other than that provided by our courts of law. From my own observation of silicosis litigation, I believe that from the standpoint of the employer, the employe, and the public, some agency other than our courts of law should be established to determine the liability of employers for occupational disease injuries sustained by their employes.

I have mentioned the possible inequities that have existed under our compensation acts and in the administration of their provisions. However, I believe today it is fair to state that any attempt to effect the repeal of those compensation acts would meet with the combined resistance of employer and employe alike. Neither interest would desire to transfer back to our courts administering common law, the question of the legal liability of employers for accidental injuries sustained by employes in the course of their employment.

Therefore, in view of the past administration of our compensation laws, unsatisfactory to certain interests as they may have been, it is not unreasonable to hope that intelligent occupational disease legislation may similarly meet with the approval of employer and employe alike. Furthermore, it is reasonable to hope that such legislation may eliminate the possibility of expensive litigation that may arise and serve the social needs of all parties interested in this problem.

The statutes providing compensation for silicosis injuries that have been heretofore adopted in several of the states vary both as to form and as to provisions for their administration. In my judgment, uniformity of legislation is not only impossible of achievement, but distinctly inadvisable. Industrial conditions vary greatly in the different sections of the country, and what may be the answer to the problem in the state of New York may be entirely separate and distinct from the answer to the problem in California. Any legislation proposed to be adopted must be suitable to the particular working conditions in the particular state in which it is to be applicable. A frank recognition of this fact will eliminate unnecessary contention with respect to such proposed legislation.

Again, some of our friends who purport to speak for labor have been advocates of the so-called "all-inclusive" occupational disease acts. In my judgment, the "all-inclusive" occupational disease acts tend inevitably to health insurance and enable the department charged with the administration thereof to award compensation to all the human ills that may occur to employes in the course of their employment.

Another phase of the problem of silicosis compensation legislation is that of accrued liability. In most instances where silicosis is found to exist, the employes have accumulated the injurious substances that cause their condition during the term of their employment before such proposed legislation could become effective. With respect to that liability, I believe it is inequitable to saddle the expense thereof upon industry at one given time and some method should be found for apportioning this accrued liability.

Another most important element to be considered in the drafting of silicosis compensation legislation should be a provision for the appointment of a competent medical board. Neither lawyers nor laymen are in the position to pass upon medical questions nor to determine the existence of occupational diseases in industry nor the disabling effect thereof. The determination of such injuries must be taken from lay juries and from commissions incompetent to determine such medical questions.

Necessity of Prevention

I wish to emphasize what to me seems to be the most important aspect of this problem, namely, prevention. From the standpoint of those who labor, they should be far more interested in the maintenance of their health in their particular employment than in compensation for injuries to that health. From the standpoint of employers, the cost of prevention of occupational disease injuries will be but a small fraction of the ultimate cost of compensation for such injuries.

With respect to silicosis, through agencies such as your own, the United States Public Health Service and other state and industrial organizations in which industry may have confidence, there is available, to you as employers, scientific information as to methods of eliminating most of the silica hazard that exists in your particular industries. If for none other than selfish reasons, you, as employers, should make use of this information. The initial cost may seem great, but it will many times repay

the cost of compensation for silicosis injuries.

I do not believe that modern society will countenance the continued failure of many industries to utilize such available methods of engineering control as will tend to minimize the hazard, and I hope that in your industrial processes each of you here assembled will renew your interest and activities with respect to your own important departments of industrial hygiene.

Labor, for its part, must discharge its duties with full appreciation of the hazards that are present in the particular industries wherein its members are engaged. There must be no half-hearted use of protective appliances with which labor may be supplied. Similarly, there must be no half-hearted enforcement of factory rules and regulations with respect to the use of such appliances. Again, there must be a coöperative observance of rules and regulations that may be laid down by safety engineers or state officials with respect to health conditions in your plants.

The problem of health must become a major consideration by all interests involved and I honestly believe that with full coöperation by employer and employe alike, industry may be well on its way to elimination of this hazard and may relegate the problem of compensation for such injuries to such statutory provisions as the state may see fit to adopt, reasonable in their provisions, but unnecessary to enforce because of the previous elimination of the hazard.

New Officers

UNITED STATES GYPSUM CO., Chicago, Ill., has made Sewell L. Avery, former president, chairman of the board, and Oliver M. Knode, former executive vice-president, president. Mr. Knode is 55 years old and was in the operating department of the company for many years.

New Kiln

DOBLASUE LIME AND MINING CORP., Republic, Wash., has recently built a new modern shaft kiln at its plant four miles west of Republic. The officers of the newly incorporated company are O. W. Noble, president; J. N. Frye, vice-president and general manager; F. J. "Pat" Noble, treasurer, and E. B. Foley, secretary.

Plant Projected

BLUE DIAMOND ROCK CO., Los Angeles, Calif., has been granted a permit to build a gravel plant in the Rio Hondo wash, west of Peck road, El Monte, by the county board of supervisors, over the protests of some local residents.

Concrete Pavement Yardage

AWARDS of concrete pavement for October, 1936, were announced by the Portland Cement Association as follows:

Type of Construction	Sq.yd. awarded during Oct., 1936	Total sq. yd. for year to date, Oct. 31, 1936
Roads	4,482,122	34,057,156
Streets	1,575,264	13,377,636
Alleys	24,400	314,431
	6,081,786	47,749,223

Contract Let

MONSANTO CHEMICAL CO., St. Louis, Mo., has awarded contracts for its new phosphate plant at Columbia, Tenn., where it has a large acreage of phosphate rock.

The new development will include a three-furnace processing plant, filtration plant and office building. It is expected to cost about $2,000,000.

Contracts for structural steel have been awarded to the Virginia Bridge Co., and the Ingalls Iron Works, Birmingham. The filtration plant is to be built by A. H. Guion Construction Co., Charlotte, N. C.

Rock Wool Producer

G. & W. H. CORSON, INC., Plymouth Meeting, Penn., is now a manufacturer of rock wool. The firm is one of the oldest in the lime industry, having been established in 1822 by Alan Corson. His fourth generation descendents, Philip L. Corson, president, Bolton L. Corson, vice-president and Carroll L. Corson, secretary, now own and operate the business.

Wisconsin Sand Plant Doubles Capacity

BROOKFIELD SAND AND GRAVEL CO., Brookfield, Wis., completely rebuilt its plant last spring to increase its capacity to approximately 50 cu. yd. hourly—an increase of 100%. The deposit worked has a preponderance of sand and small gravel, with approximately 15% of large stone. From the top of the bank to the surface of the water is 85 ft.; test drillings have shown the deposit to extend at least 40 ft. below the water's surface. The deposit is being worked to a depth of 14 ft. below the water level.

Considerable of the larger material, previously wasted in the 6-in. dredging operation, will now pass the 8-in. pump and pipe-lines. The new 8-in. Amsco pump with bottom discharge has been installed. It is driven by a 125-hp. Allis-Chalmers motor through a V-belt drive (Raybestos-Manhattan). A 4-ft. diameter stone box, with grates, does not permit stone over 5¾ in. in size to enter the pump. Sand and gravel are pumped through 360 ft. of pipe along the water and an additional 80-ft to the discharge box. The pump is operating under a 106-ft. head.

The screening unit is an entirely new arrangement, set on new reinforced-concrete foundations. Only one size of material, mason's sand, was produced by the plant when it was operated by the Badger Sand and Gravel Co. prior to its being taken over by the Brookfield Sand and Gravel Co. Mason's sand, torpedo sand and No. 1 gravel are now produced.

The sand and gravel is pumped to a discharge box 14 ft. 6 in. long, 2 ft. wide and 2 ft. deep, lined with galvanized sheet iron. Material passes from the discharge box to a new 3-ft. by 8-ft. double-deck Toepfer vibrating screen, driven by a 7-hp. Allis-Chalmers motor. The screen operates on Dodge-Timken bearings, and is equipped with 1¼-in. and 5/16-in mesh wire cloths for separating the stone size from the sand.

Oversize gravel passes through a chute to a Good Roads jaw crusher below, which is set for No. 1 (1¼-in.) stone. After crushing, the stone is elevated by a bucket elevator operating on 52-ft. centers, to the same discharge box. Here it is rewashed, the dust being carried to the torpedo sand stock pile through the flume trough and the stone going back over the vibrating screen. No. 1 stone is dropped direct to the No. 1 stone bin. A 30-hp. G.-E. motor drives the elevator and crusher.

Sand Classification

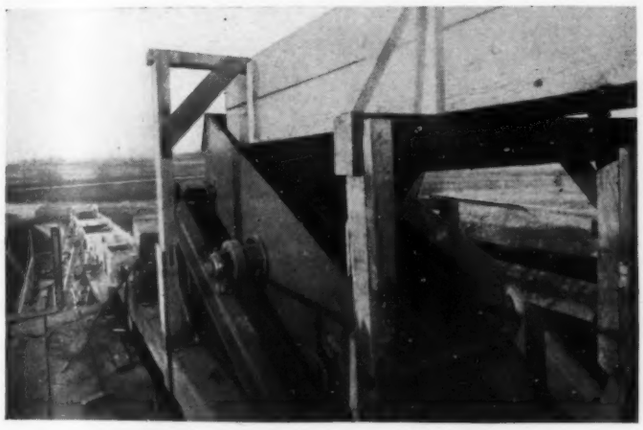
Sand is classified after passing the screen. This classification takes place while passing down the flume trough, which has a slope of 8 in. in 50 ft. Screen cloth with 3/32-in. openings is placed in the floor or bottom over the first four sand-settling tanks or "possum bellies" and 5/16-in. cloth is placed over the others set along the length of the flume. Each of these sand tanks has a capacity of 1 cu. yd.

Each of the sand tanks discharges to the ground below, through manually-operated valves, where the sand is loaded into trucks by a Link-Belt loader.

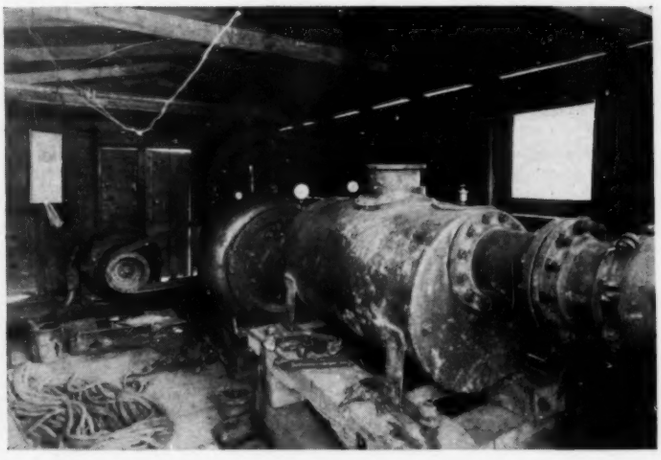
The plant is located in a hollow, with its highest point at approximately the same elevation as the surrounding country. Overflow water from the sand-settling tanks passes through the flume to a settling basin on the hill-side, from which clarified water flows through a 2-ft chute back to the lake.

The company ships by truck to Milwaukee for construction and residential building, and in addition sells a sand under the trade name "Safety Sand," advertised for slippery walks and drives, play boxes, scratch boxes, furnace heads, aquariums and plastering. Shipments are made in two Dodge trucks, each of 1½-ton capacity.

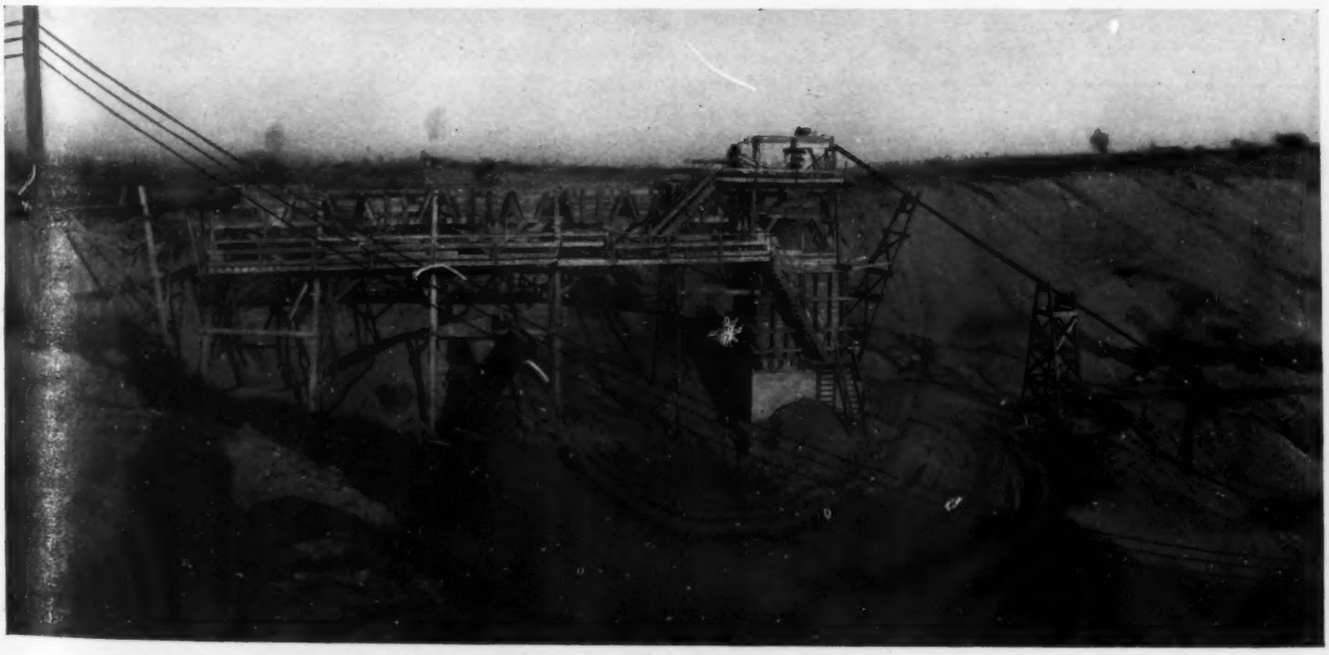
Plant of Brookfield Sand and Gravel Co. as seen from the dredge, showing its position in a natural valley



Vibrating screen on top of Brookfield, Wis., plant



Pump and stone box on the dredge of Wisconsin sand company



Sand boxes and overflow flume at plant of Brookfield Sand and Gravel Co.

FARM-to-MARKET Roads

In TENNESSEE Require Much

CEMENT, STONE, GRAVEL

By Burr Cullom

Editor's Note

NOT ALL WPA work is waste. It depends on the man in charge. Tennessee is fortunate in having Col. Harry S. Berry, whom many rock products producers will recall because of his helpful but brief service as an NRA code administrator.

This article was written by a member of the staff of the WPA Tennessee state administrator, who is Col. Berry, but he did not know we were going to use it, as we have, to prove that even WPA can accomplish something worthwhile in the hands of a capable administrator.

It is published here in the hope of showing producers of rock products that there are opportunities under WPA. Probably much of the crushed stone and gravel used in this Tennessee work is produced locally by various governmental units, but some is purchased, and perhaps more would be purchased if local producers used more ingenuity in devising ways and means to help Col. Berry spend his allowance to even better advantage.

—The Editor

Col. Harry S. Berry at his desk in Nashville, Tenn.

THE OBJECTIVE of the WPA is to provide jobs on works of public value. The big farm-to-market road program in Tennessee does this. Picks and shovels are used by the hundred thousand. But heavy equipment is also required. Air compressors, power drills, blasting outfits and rock crushers are needed to produce the aggregates for concrete piers and bridges. Trucks and teams, with a long line of attendant supplies, ranging from gasoline and tires to steel files and rubber hose, are required to provide common labor with jobs. A careful study of the subject will show that there are few lines of business that will not receive profits from the road program. The taxpayer is getting something for his tax dollar while providing jobs for the unemployed.

36,000 Miles of Rural Mail Routes

The work done in Tennessee is an outstanding example of what has been accomplished. Tennessee is a state predominantly agricultural, with a rising im-

LEFT—A section of Tennessee road before WPA began work. CENTER—A rough graded portion, preparatory to fine grading. RIGHT—Graded road ready to be surfaced for farm-to-market use

BEFORE: The mud was hub-deep until reconstruction and drainage were started

AFTER: On the finished road rain no longer creates an impassable barrier

portance in manufacture. According to Col. Harry S. Berry, the state WPA administrator, there are 36,000 miles of rural mail routes in the state. Many of these are hub deep in mud for long distances during bad weather. But before the program is completed, all of these roads will be widened, drained and surfaced according to need. All-weather roads will cover the state in a network that will make it possible for the mail carriers to reach remote patrons regularly. With easier access to markets, the farmers will profit and the city dweller will benefit in fresher produce and cheaper prices due to lower transportation costs, breakage and spoilage.

At the end of September the Tennessee Highway Department, which supervises the farm-to-market program, reported to Col. Berry that 18,687 miles of road had been widened and reshaped. Over 6,800 bridges had been built, of which 72 were of steel with an average length of 69 ft. The metal and concrete pipe used would, end to end, stretch 221,856 ft.

This splendid showing has been made possible by certain favorable factors, including the close coöperation of the county sponsors, the expert supervision of the Tennessee Highway Department and, not the least in importance, by the workers themselves, whose skill is rapidly improving. Weather during the spring and early summer was open, but the winter of 1935-36 was unusually severe for this section and work was considerably impeded.

Surfacing Material

The surfacing already done in the state is largely of untreated crushed stone and gravel, though in one mountainous county, Hamilton, of which Chattanooga is the county seat, 370 miles of bituminous coating has been applied. This county is a mecca for tourists, not only because of its rich scenic attractions but also for its historic interests.

The amount of crushed stone and gravel required in the state, for water-bound macadam roads only, reached a total of 3,047,933 cu. yd. This quantity was used in the period extending from September, 1935, through September, 1936.

The rock for macadamizing meets state specifications, which require a maximum wear of 7% and toughness not less than 6%. It is sound as determined by sodium sulphate tests. Limestone is found in abundance in Tennessee, except in the lowlands west of the Tennessee River. This low-lying section extends to the Mississippi River but the area is not without satisfactory natural surfacing materials. A natural chert with clay binder is available in large quantities and at convenient points. For farm-to-market roads, such as WPA is constructing and improving, this chert has been found to produce a satisfactory surface. As a matter of fact, it has proved of such worth that it has been shipped for years by commercial interests to other states. Arkansas is a large user of this material.

Clay-Gravel Beds Supply Stabilized Mat

Gravel is also being used as a surfacing material to a large extent, especially in the counties where adequate deposits are within convenient hauling distance of the road work. Deposits of gravel are found in stream beds mixed with a satisfactory clay that forms a stabilized mat. Under normal conditions of traffic and weather, this surfacing has proved very satisfactory.

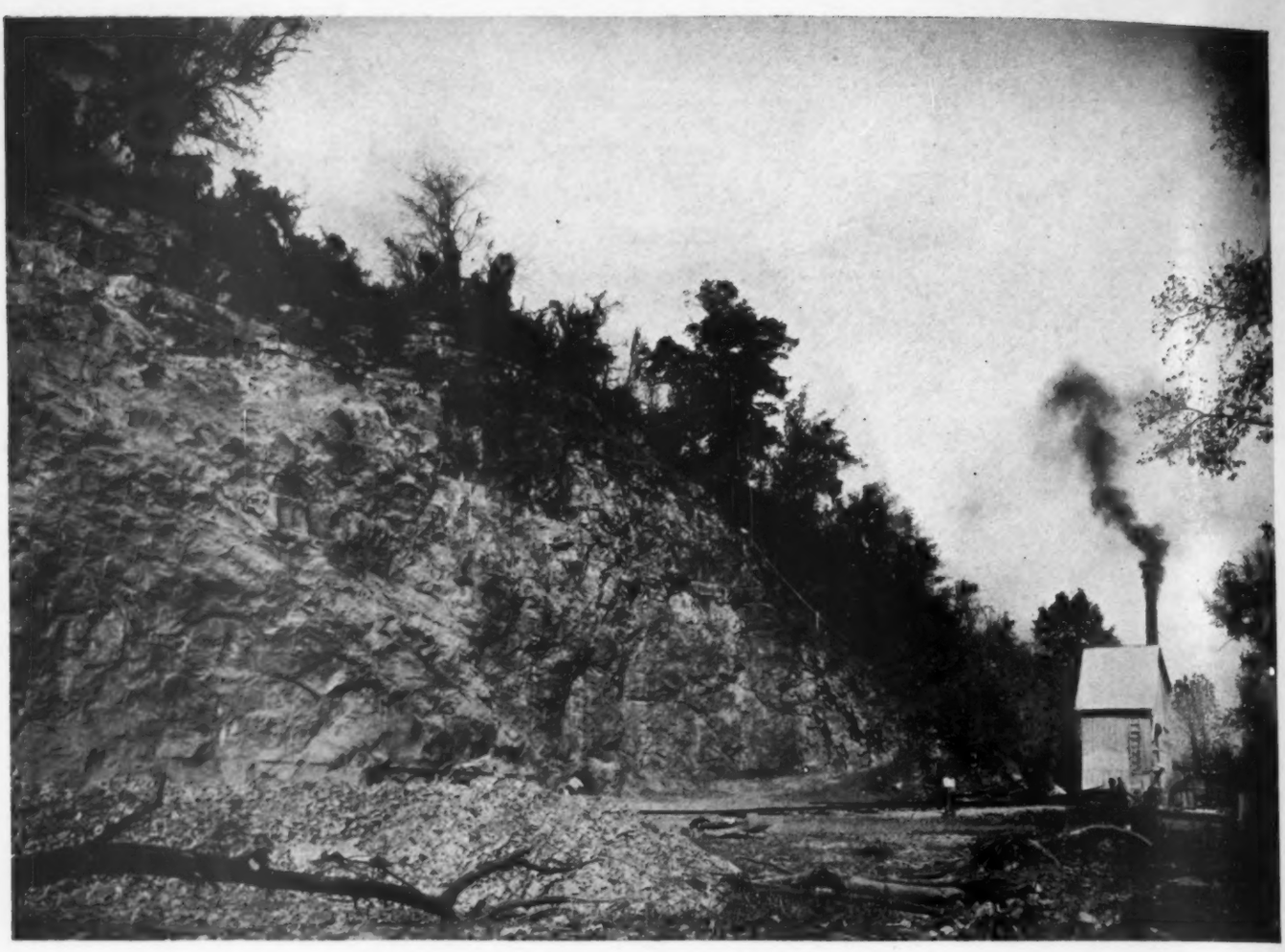
One of many such deposits is in Wilson County. That county owns three acres of an old cornfield that is in the bed of an ancient river. Upon removing the overburden on two acres of this tract, a clay-gravel deposit was found from six to eight feet deep. This material has proved accessible, economical and serviceable. The gravel bar is scarified by a Caterpillar scraper equipped with teeth. The material is scraped into windrows and loaded by hand into trucks that follow the grader. Three trucks make hauls of two tons each trip, a distance of about two miles.

In this county, as in scores of others, where secondary roads pass through unincorporated villages, the road surface is oiled. That practice is also followed for some distance on all approaches to large towns.

Cost Apportionment

The cost of the farm-to-market road improvements is financed by WPA-county. The counties receive part of the license tag funds plus two cents out of a total gasoline tax of eight cents per gallon. Out of this apportionment the counties provide matching funds in the ratio of 30% county and 70% WPA. Allocation of federal funds is made on the basis of relief load on this type of work and runs from $432 to $594 per man-year in this state. The scale is based on density of population. It follows that in small sparsely settled counties both the traffic and relief loads will be low. Funds coming from the revenues mentioned and from federal aid, consequently, will be proportionately low.

While the funds regularly available for road improvements may thus be small in these counties, yet certain conditions may make it very desirable to build or improve roads in such sections. For example, in the mountains of East Tennessee there is a greater variety of



A typical quarry and crushing plant in Tennessee's road program

timber than is found in all Europe. There are many valleys with soil that is productive to a profitable degree. In those sparely settled counties there is some of the most inspiring scenery found anywhere east of the Rockies. And there are scores of inaccessible spots that have rich historical interest. Thus it may be highly desirable to make these places accessible in spite of the fact that county and federal aid is limited. It is the Highway Department's job to decide on the best type of improvements and the best materials to use in such cases as well as to find additional funds where possible.

Through October 31, 1936, the following amounts had been spent for rock products construction materials for these WPA projects (commitments in the progress of payment will add largely to these figures):

Item	Federal Funds	Sponsor's Funds	Total
Sand and gravel	$215,949	$114,435	$330,334
Crushed stone	93,598	235,351	328,949
Cement	260,402	62,360	322,762
Concrete products	147,215	23,376	170,591

Awards are made on competitive bids. Invitations to bid are posted in district Procurement Offices and are mailed to suppliers in every part of the state. When requested these are also mailed to suppliers in other states.

At an average of 4½ individuals per family, the road program in Tennessee alone gives support to 81,000 persons. "The latest program (1935-36) convinced me," said Col. Berry, in discussing this phase of his work, "that rural road construction allows the maximum use of unskilled labor at a maximum of efficiency."

Cement concrete is not much used for surfacing the type of roads being built by WPA in Tennessee, but such structures as this bridge have consumed an appreciable amount

Big Increase in Construction

A SIXTY-THREE per cent increase in the volume of total construction in the United States occurred during the first ten months of 1936 over the corresponding period in 1935, the F. W. Dodge Corp. has reported to Public Works Administrator Ickes.

Private construction jobs are keeping pace with public works, the report said, and in October private construction awards exceeded public construction awards for the fifth time this year.

Commenting on this, the PWA said, "This fulfills the original PWA theory and premise that a revival of the hard-hit construction industry, through public works building, would be paralleled by recovery of the industry in private construction."

The corporation's report, covering the 37 states east of the Rocky Mountains, said, in part:

"Out of a total for the 37 eastern states, amounting to $225,767,900 for October, 1936, $124,510,100 was for private jobs and $101,257,800 for public construction. In September, private work accounted for $118,710,900 out of a total of $234,271,500, while in October of last year private work was much less important than public construction, accounting for only $86,908,000 out of a total, both public and private, of $200,595,700.

"The construction total, both public and private, for the first ten months of 1936, amounted to $2,267,396,100, making an increase of 63% over the total of $1,392,293,400 for the corresponding period of 1935. Of the cumulative 1936 volume, $1,104,686,000 was for private construction, while $1,162,710,100 was for public jobs. Of the 1935 cumulative figure, $698,880,400 was for private jobs and $693,513,000 for public."

Walsh-Healey Ruling

THE Department of Labor recently released a clarification of the Walsh-Healey Act concerning computation of overtime. Secretary Perkins said that in response to inquiries as to whether there was any limitation on the time any employe could be required to work in any day or any week, provided he was not permitted to perform work covered by the contract stipulations for longer than eight hours a day, or 40 hours a week, it has been determined that article 103 of the act forbids an employer to permit an employe who has performed any work covered by the contract stipulations during any part of the week to exceed the limits fixed by the act without paying the overtime rate. Accordingly, if an employe has worked 40 hours in any one week on a Government contract coming within the act, he is entitled to the overtime rate set by the Secretary of Labor if he is called upon to do other work by that employer in the same week.

The clarification was set forth in a letter to H. E. Collins, assistant director of the procurement division, Treasury Department.

Alleged Combine

AN INVESTIGATION of an alleged unlawful combine in the fertilizer industry is being pursued actively by the anti-trust division of the Department of Justice, according to the *Wall Street Journal*, which states:

"The investigation was instigated principally upon evidence submitted at hearings last session before a sub-committee of the House Appropriations Committee, which apparently was not included in the published record.

"Assistant Attorney General John Dickinson, who is in charge of the anti-trust division, admitted that the investigation was in progress. He said, however, he had not received any report from his agents who are making the investigation, and did not know what, if any further action might be expected.

"At hearings last session before a subcommittee of the House Appropriations Committee, Representative Tarver (Dem., Ga.) called to Mr. Dickinson's attention evidence before the subcommittee which he said indicated the existence of an unlawful combine in the fertilizer industry, and which he thought warranted an investigation by the Department of Justice."

Ruled Unconstitutional

FEDERAL JUDGES John P. Barnes and Will H. Sparks of Chicago and F. A. Geiger of Milwaukee on November 6 at Milwaukee, Wis., held the Wisconsin recovery act invalid and enjoined its enforcement and the state codes for the cleaning and dyeing and the paiting industries, according to the *Chicago Journal of Commerce*.

Attorneys for a Waukegan, Ill., dry cleaning business and a Milwaukee dye works attacked the price-fixing provisions of the code as unconstitutional.

The state plans an appeal from the temporary injunction the court ordered prepared. The act is the second Wisconsin law patterned after the old NRA, the first having been found unconstitutional by Wisconsin supreme court. The second one has been declared constitutional by the state supreme court.

Wages Raised

LONE STAR CEMENT CO., raised wages an average of 10% at its Bonner Springs, Kan., plant, beginning November 5.

Silicosis Insurance Rates

LOWER RATES on New York State compensation insurance covering silicosis hazards are provided in amendments to certain rates promulgated on November 8 by the Compensation Insurance Rating Board. All changes are effective as of June 6 of this year.

The largest change provides that "a credit of 25% from these values shall be allowed in every case where the carrier's inspection report for a particular audit period indicates that dust control equipment acceptable to the board was actually used during that period."

Dust control equipment is now undergoing tests in a Rockland county laboratory under supervision of labor department engineers and following specifications outlined by the advisory board. Since official approval has not been given to any dust control devices as yet, the rating board's ruling means that the credits will be allowed to users of devices which may be approved at some future date.

The credits are allowed on various mining, quarrying and lime manufacturing occupations.

Silica Byproduct

FELDSPAR producers in the Spruce Pine, N. C., district are said to be anticipating converting thousands of tons of waste silica into glass sand as a result of recent shipments from the China Clay Co. to the Corning Glass Co. for making glass building block. It is hoped that the froth flotation process of separating feldspar from quartz will be developed on a commercial scale, which would permit development of numerous low-grade feldspar deposits.

Assistant Secretary of Navy

EDISON PORTLAND CEMENT CO., Stewartville, N. J., president, Charles Edison, has been appointed assistant secretary of the United States Navy Department, by President Roosevelt. At present Mr. Edison is New Jersey state director for the National Emergency Council.

Group Insurance

GIBSONBURG LIME PRODUCTS CO., Gibsonburg, Ohio, has made its 81 employes eligible for group life insurance of the contributory type, the employes paying a part of the premium individually and the company the remainder.

Sea-Going Sand

PORT OF PALM BEACH, Fla., recently received the largest cargo in the history of the port. It was 5000 tons of sand and gravel by the freighter *Silver Sword* from Baltimore, Md.

Chemists' Corner

OIL WELL CEMENTS—

Effect of Hydraulic Pressure on the Properties of Neat Cement

By S. L. Meyers,
Southwestern Portland Cement Co.,
El Paso, Texas

IN THE PRODUCTION of petroleum from oil-bearing strata beneath the earth's surface, a hole is drilled to the reservoir sands, or porous rock; iron pipe, or casing, somewhat smaller in diameter than the hole is set in place, the oil flows through the casing to the surface; usually by reason of its own formation pressure, later as the pressure is lowered, pumping may be resorted to.

There are several reasons for cementing an oil well, and many conditions where cement can be used most advantageously in the well; but the most general reason is to prevent water from strata above the oil-bearing formation migrating into and contaminating the oil. Hundreds of thousands of barrels of cement are annually used in cementing wells.

Neat cement mixed with about 40% water is pumped down the casing with high pressure pumps, on top of mud fluid or water, which precedes the cement. Cement escapes from the open end of the casing, which has been raised a few feet from bottom of the hole, and is forced up the annular space between the outside of the casing and the walls of the hole. When the desired amount of cement paste has been pumped into the casing, water or mud is pumped in on top of the cement paste and displaces it within most of the casing; leaving only a few feet of cement in the casing. A valve is closed at the casing inlet, or "casing head," and the cement fluid comes to rest and is allowed to harden.

The cement at the bottom, or "shoe," of the casing is now in hydrostatic equilibrium between the pressure due to its own weight on the outside of casing, plus the weight of mud or water placed ahead of the cement, and the pressure due to the weight of mud or water on the inside of the casing plus the pump pressure necessary to maintain this equilibrium, and also frequently to maintain a balance against formation or "rock" pressure.

Oil-bearing strata may occur near the surface of the ground, or far below it. The bottom of the average oil well is below 3000 ft. and several wells have been drilled to depths of greater than 10,000 ft.

Rock pressures of 2000 lb. per sq. in. are common, and in a few localities are as great as 5000 lb. per sq. in.

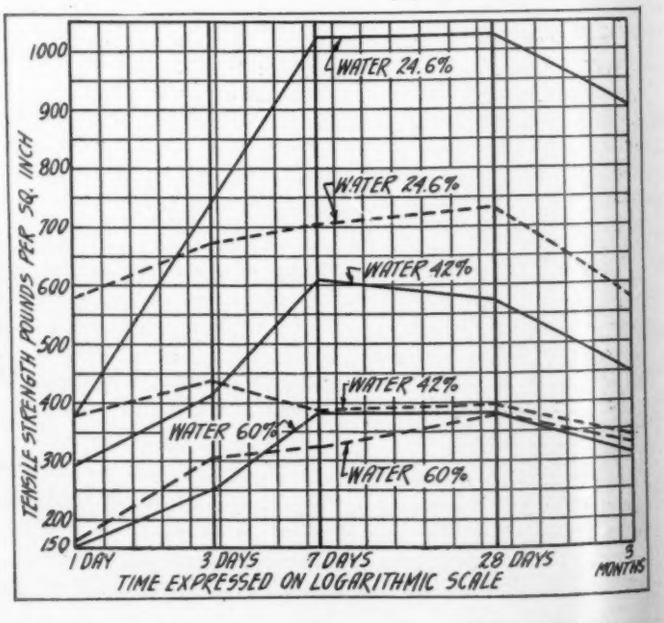
At the bottom of a 3000-ft. well a column of water filling the casing has a hydrostatic pressure of 1300 lb. per sq. in.; mud with a specific gravity of 1.2 has 1560 lb. and neat cement fluid with a specific gravity of 1.9 exerts 2470 lb. per sq. in.

What effect does this high hydraulic pressure have on the properties of the neat cement paste as it hardens? If all cementing jobs were successful this question would be of merely academic interest. But since some cementing jobs are failures, and since many uncontrolled conditions are often present which may affect the hardening of cement grout either adversely or favorably, such as, high temperatures, gas, oil, and water agitation of grout; contamination by saline or gaseous waters in the well and excess mixing water, improper placement of cement, etc., the answer to the question, "What effect does pressure have on neat cement grouts," may help us to place the proper value on some other factor, or factors, which may have contributed to the failure of the cementing job.

The apparatus used for the high pressure tests, described here, was an extra heavy walled pipe with a heavy steel flange bolted on each end of the pipe, using 16 bolts in place of the usual eight. A rubber gasket between the pipe and the flange was used to make these ends water-tight. A small hydraulic pump with a ¼-in. diameter piston, having check valves for the water before and after the stroke, en-

TABLE 1. EFFECT OF 2000 LB. PRESSURE STORAGE ON NEAT CEMENT BRIQUETTE STRENGTH

	%H_2O	1 da.	3da.	7 da.	28 da.	3 mo.
Water storage, 70° F., no pressure.....	24.6	375	733	1023	1028	837
Water storage, 70° F., 2000 lb. pressure.....	24.6	580	673	700	730	573
Water storage, 70° F., no pressure.....	42	292	412	607	572	430
Water storage, 70° F., 2000 lb. pressure.....	42	375	435	382	388	335
Water storage, 70° F., no pressure.....	60	155	252	382	380	307
Water storage, 70° F., 2000 lb. pressure.....	60	165	303	322	377	320



Graph 1—Effect of pressure storage on tensile strength of neat briquettes. Solid lines show results under no pressure; broken lines show results with 2,000-lb. pressure

abled the water pressure to be built up easily by hand power. A gauge, reading to high pressures, was connected to the pressure chamber. All permanent connections were welded.*

Effect of Pressure on Strength

Table No. 1 shows a comparison of pressure, and no pressure storage, on neat briquette strength up to three months. Normal consistency for the oil well cement was 24.6% water; 42% water is about the usual amount of mixing water used in oil field practice; 60% water would be an extreme case of using excess mixing water while placing cement.

At 24 hours, pressure storage shows higher strength than no pressure storage. This is also generally true at three days, but at later periods pressure storage nearly always shows less tensile strength than no pressure storage.

In both kinds of storage test pieces approach maximum tensile strength at about seven days, and there is little gain after this; while the three month tensile strengths are below the 28-day ones. Some of the loss of strength which frequently occurs could possibly be due to an increase of brittleness of the hardened grout with age, unbalanced stresses on specimens while under test causing premature failure.

Great variations in the strength of neat briquettes from the same batch, also an increase of hardness and compressive strength with age, indicate that some imperfection in tensile testing is at least partly responsible for loss of strength at later ages, in this case. Graph 1 illustrates the results taken from Table 1.

Table 2 shows some compression strength results at one and three days.

Like the tensile tests, the compression strength of these neat grout specimens is greater under pressure than with no pressure storage, for these early periods.

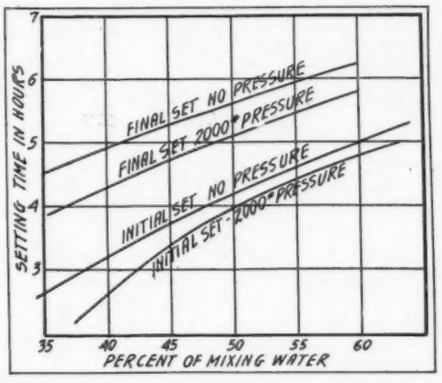
The ignition loss and CaO from liberated calcium hydrate is determined upon the broken specimens after being ground and then dried in an oven at 100 deg. C.

* Pressure apparatus designed by R. T. Mann.

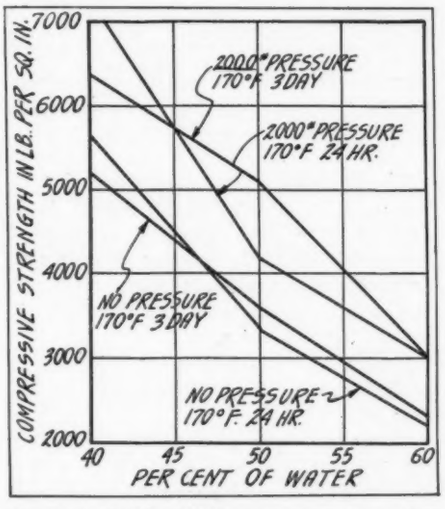
TABLE 2. SOME EARLY AGE EFFECTS OF 2000 LB. PRESSURE STORAGE ON NEAT 42% OIL WELL CEMENT GROUT, 70 DEG. F.

	No pressure		2000 lb. pressure	
	24 hr.	3 da.	24 hr.	3 da.
Compressive strength lb. in.^{2}	2075	5600	2440	4950
Ignition loss	12.68	14.67	13.60	15.40
CaO *Calc. to ignited basis	8.80	13.36	12.41	16.88

* CaO from $Ca(OH)_2$ by ammonium acetate method.



Graph 2—Effect of high pressures on setting times of oil well cement grouts



Graph 3—Effect of high pressure water curing on compressive strengths of neat cement grouts at elevated temperatures

The CaO obtained by the ammonium acetate method† on the dried sample has been calculated to a loss free basis after determining the ignition loss.

† $BaCl_2$ used for CaO determination in Table 2, but not used in Table 3.

Table 3 gives more results on another sample of oil well cement than the one used in Table 1. The results of pressure storage are similar to the results in Tables 1 and 2; except the three months tensile strengths show a gain in strength, in most specimens, instead of a loss, compared to the 28-day strength.

In spite of the strength with pressure storage being lower than with no pressure storage at 3 months, liberated lime and ignition loss indicate a greater degree of hydration.

Table 4 gives a few examples of compressive strength and expansion of hardening of heat bars in water, under pressure and with no pressure storage for cements of different composition. These bars hardened in their molds until they were 24 hours old; they were then removed from molds, measured, and placed in their respective conditions of storage to be measured again at 28 days.

Tests made on expansion were too few to draw any general conclusion, but indicated that expansion did not differ greatly under 2000 lb. pressure storage from that with normal water storage.

On Setting Times

Graph 2 shows that while the initial and final sets as determined with Gilmore needles were a little more rapid under pressure, they were not a great deal more rapid. And pressure alone could not cause the grout to set too rapidly to place in an ordinary cementing job.

As it was necessary to release the pressure and remove test pieces from pressure chamber every 30 min. for the needle test, the pressure was not continuous; and also, setting times had to be interpolated between test periods.

In descending below the surface of the earth, not only does pressure in-

TABLE 3. STRENGTH COMPARISON BETWEEN NO PRESSURE AND PRESSURE STORAGE, WATER STORAGE 70 DEG. F., USING SPECIAL OIL WELL CEMENT WITH VARYING WATER CONTENTS. AGE ONE WEEK TO THREE MONTHS, WITH RESULTS ON DRIED GROUT AFFECTED BY DEGREE OF HYDRATION AT 28 DAYS AND THREE MONTHS.

		Tension			Compression			Ignition loss		CaO * Ignited basis		Specific gravity
Storage	%H_2O	7 da.	28 da.	3 mo.	7 da.	28 da.	3 mo.	28 da.	3 mo.	28 da.	3 mo.	3 mo.
2000 lb. pressure	35	460	447	440		none made		13.00	....	10.72	....	....
No pressure	35	775	605	685	8300	8350	11333	13.77	15.80	9.00	....	....
2000 lb. pressure	42	420	387	410	5425	7450	5125	13.40	18.00	11.97	13.91	2.24
No pressure	42	395	477	663	5359	7860	8898	14.52	15.79	11.52	13.54	2.24
2000 lb. pressure	50	392	360	357	3450	5350	4850	13.00	18.22	11.71	15.42	2.24
No pressure	50	360	460	533	3775	5967	7116	14.23	16.73	11.69	14.34	2.23
2000 lb. pressure	60	247	320	333	1960	3875	3625	13.79	18.50	13.03	16.74	2.23
No pressure	60	310	441	462	2127	3925	3600	15.01	18.65	12.38	15.93	2.23

* CaO from $Ca(OH)_2$ by ammonium acetate method.

TABLE 4. CHEMICAL ANALYSES OF CEMENTS AND EFFECT OF PRESSURE STORAGE ON NEAT CEMENT SPECIMENS

	Free CaO	Compounds C_4AF	C_3A	C_3S	C_2S	% H_2O in neat grout	% expansion of neat bars in water storage at 70 deg. F. No pressure	2000 lb. pressure per sq. in.	28 da. compressive strength, neat 42% water mix, water storage at 70 deg. F. No pressure	2000 lb. pressure per sq. in.
High C_3S	0.54	5.65	5.58	46.85	34.86	42%	0.024	0.030	3510	3400
High C_3S						25%	0.038	0.058	....	....
Oil well cement	0.80	8.57	9.01	8.10	65.73	42%	0.049	0.031	8898	5125
Oil well cement						25%	0.075	0.089	....	....
Low C_4AF	0.00	6.89	11.98	17.42	64.84	25%	0.108	0.139	....	....
Low C_4AF						42%	....	....	9100	7920
High C_2S	3.12	9.24	8.19	5.29	71.84	25%	0.348	0.219	....	....
High C_4AF	2.27	21.58	0.08	11.91	62.13	42%	....	....	6150	5145
High C_3S	1.29	7.90	8.89	4.17	70.62	42%	....	....	7100	5180

crease with depth but temperature does likewise.

Graph 3 shows that the effect of temperature is to greatly raise the 24-hour compressive strength of mixtures with between 40 and 45% water. At three days retrogression showed with these water percentages.

While the combinaton of pressure and high temperatures together at early ages show higher results than temperature alone, high temperatures alone show a greater accelerating effect than high pressure at 70 deg. F. (Results not shown on graph.)‡

Permeability

Since portland cement grout is used mainly to prevent migrating waters from invading oil reservoirs, or invading the oil during production, it would seem that the impermeability of the hardened cement grout to water seepage, or flow, is a more important property than strength.

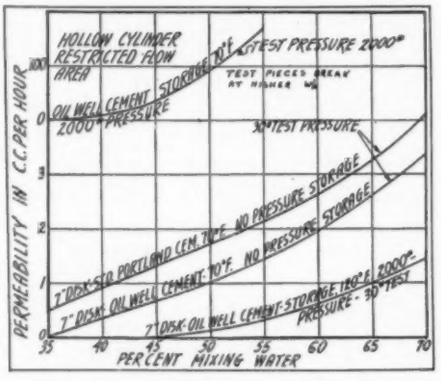
Graph 4 shows the effect of percentage of mixing water on permeability.

In the lower curve the specimens hardened under pressure show less water flow than those hardened under no pressure storage.

Unfortunately, the storage condition for specimens represented by this curve was 120 deg. F., and the higher temperatures undoubtedly decreased permeability to some extent; however, other tests made at 70 deg. F., 2000 lb. pressure, 42% water, show less permeability than the no pressure curve, 42% water.

It was noted that in those cases where the neat cement fluid was put into molds and the molds immediately put into water pressure storage, upon inspection the next day the hardened specimens were smaller than comparison specimens hardened either in moist air or under water without pressure. This is shown to be true by the following results on apparent specific gravity of hardened cement grout using 42% mixing water (actual % of water of total mix equals 29.6%:

‡ Other tests made here indicate that at later ages the temperature has a more harmful effect on strength than pressure.



Graph 4—Permeability of hardened cement grouts at age of three days

If the high pressure decreased pore space it is reasonable to expect it to have a beneficial effect in decreasing permeability and helping the neat cement resist water invasion, which is the most important consideration in cementing oil wells.

While later strengths are reduced by high pressure, early strengths are increased.

Early strength and quick hardening are important where gas, oil, or water agitation can possibly act on cement and prevent it from setting up at all; while later strengths do not appear to be of primary importance.

STORAGE CONDITION	No Pressure	2000 lb. per sq. in.
Test at 24 hours	2.017	2.044
Test at 4 days	2.020	2.055
Test at 3 weeks	2.043	2.077
Test at 1 month	2.044	2.082
Actual specific gravity on ground dried sample.		
At one month	2.29	2.30
% voids by volume	18.98	17.67

It appears that high pressures in hydrostatic equilibrium are not a cause of cement failures, but the cause will probably be found in one, or more, of many possible factors.

Building Crushing Plant

HARRY ZEEFF & SONS GRAVEL CO., Grand Rapids, Mich., is building a crushed-stone screening plant this fall.

Form Association

FELDSPAR MINERS' ASSOCIATION, representing producers of between 75 and 80% of the feldspar output of North Carolina and Virginia, was recently organized at Spruce Pine, N. C. After discussion of proposed by-laws for the association, the draft submitted by a committee appointed some time ago was adopted substantially as drawn. Essential features of these by-laws are a minimum wage of 25 cents an hour, with 40 hours average per week taking the entire year as a basis of the average.

There are no methods of enforcing these and other regulations included in the by-laws. It is considered, however, that all except a very few small miners of feldspar will continue to adhere to them, as they have to similar agreements since the abolition of the NRA.

The officers of the association are: W. H. Hibbs, Asheville, president; Harry Bailey, Penland, vice-president; H. L. Pack, Spruce Pine, secretary, and R. B. Sparks, Spruce Pine, treasurer. The directors are: Messrs. Hibbs and Bailey, W. B. Robinson, Micaville; F. B. Fortner and C. R. Ricker, Spruce Pine.

New Ownership

A. W. DANIELS, Chicago Heights, Ill., well and favorably known throughout the rock products industry, has purchased the controlling interest in the Universal Crusher Co., Cedar Rapids, Ia., and on January 1, 1937, will become its president and general manager. Mr. Daniels is now general sales manager at Chicago, Ill., of the Taylor-Wharton Iron and Steel Co., High Bridge, N. J. Before that he was vice-president of the American Manganese Steel Co., Chicago Heights. Associated with him at Cedar Rapids will be H. F. Rikhoff, Detroit, Mich., former assistant secretary and assistant treasurer of the American Manganese Steel Co. He will be secretary-treasurer of the Universal Crusher Co. W. L. Harrison, who has been president of the company since 1912, will continue a director and a stockholder.

New Members

NATIONAL SAND AND GRAVEL ASSOCIATION, Washington, D. C., recently announced the following members had joined during 1936:

Arkansas River Sand Co., Tulsa, Okla.

Blue Diamond Corp., Ltd., Los Angeles, Calif.

Belton Sand and Gravel Co., Belton, Texas.

W. R. Bonsal Co., Hamlet, N. C.

Central Iowa Sand and Gravel Co., Des Moines, Iowa.

Concrete Materials Co., Waterloo, Iowa.

Consolidated Construction Co., Tulsa, Okla.

Consolidated Rock Products Co., Los Angeles, Calif.

Cooley Gravel Co., Chillicothe, Mo.

Eaton Canyon Rock and Sand Co., E. Pasadena, Calif.

Edmondson-Tamborelle Co., Houston, Texas.

Graham Brothers, Inc., Los Angeles, Calif.

Granite Materials Co., N. Hollywood, Calif.

H. & H. Rock, Sweetwater, Texas.

B. V. Hedrick Gravel & Sand Co., Lilesville, N. C.

Hodgson Sand and Gravel Co., Netcong, N. J.

R. E. Janes Gravel Co., Austin, Texas.

Lyman-Richey Sand and Gravel Co., Omaha, Neb.

Marquette Cement Manufacturing Co., Memphis, Tenn.

Merom Gravel Co., Indianapolis, Ind.

Myers Gravel and Sand Co., Anderson, Ind.

North Texas Materials Co., Dallas, Texas.

Osage Sand & Contracting Co., Osage, Okla.

Piru Rock Company, Ltd., Los Angeles, Calif.

Price Sand Co., Tulsa, Okla.

Producers Sand Co., Tulsa, Okla.

The Producers Gravel & Sand Co., Shreveport, La.

Rock, Sand and Gravel Producers Association of Northern California, San Francisco, Calif.

Smith Sand Co., Tulsa, Okla.

Standard Paving Co., Tulsa, Okla.

Tulsa Sand Co., Tulsa, Okla.

Western Sand and Gravel Co., Lincoln, Ill.

New Operation

ERNEST C. SCHROEDER, Marquette, Iowa, is moving part of the equipment of his local quarry and crushing plant to Harpers Ferry, Iowa, where he is opening a new quarry for production of aggregates for U. S. Government dams and for rip rap for the Chicago, Burlington & Quincy R.R.

Increase Reserves

FEDERAL CHEMICAL CO., Mt. Pleasant, Tenn., rock phosphate miner and processor, has acquired an option on 208 acres of land adjoining its present holdings.

• • •

ARMOUR FERTILIZER WORKS, Mt. Pleasant, Tenn., has added another tract of several hundred acres to its holdings of phosphate reserve near Columbia, Tenn.

Changes Ownership

GASTONIA QUARRIES, INC., Gastonia, Ga., has been organized to purchase the interests of W. F. Morrison, former owner and operator of the Gastonia Quarries. H. A. Horton is office manager and secretary-treasurer; John O. Gaither, Jr., sales manager. The new owners are inaugurating an expansion of activity which includes the opening of an office in Charlotte Commercial Bank building, and the placing in effect of a new policy governing sales of its products in Gaston county exclusively through the building supply dealers.

October Cement Production

THE PORTLAND CEMENT industry in October, 1936, produced 12,470,000 bbl., shipped 13,089,000 from the mills, and had in stock at the end of the month 18,119,000. Production and shipments in October showed increases, respectively, of 66.0 and 48.8%, as compared with October, 1935. Portland cement stocks at mills were 11.6% lower than a year ago.

The statistics here given are compiled from reports for October, received by the Bureau of Mines, from all manufacturing plants except three, for which estimates have been included in lieu of actual returns.

The mill value of the shipments—83,700,000 bbl.—in the first nine months of 1936, is estimated at $127,095,000.

According to the reports of producers the shipments totals for the first nine months of 1936 include approximately 2,176,000 bbl. of high-early-strength portland cement with an estimated mill value of $4,168,000.

In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 160 plants at the close of October, 1936, and of 162 plants at the close of October, 1935.

RATIO (PERCENT) OF PRODUCTION TO CAPACITY

	October		September	August	July
	1935	1936	1936	1936	1936
The month	33.1	56.0	57.1	56.2	51.3
The 12 months ended	27.6	40.0	38.1	36.1	34.0

To Rebuild

STANDARD SLAG CO., Youngstown, Ohio, has announced that it will rebuild at once its slag crushing and screening plant at Ashland, Ky., destroyed by fire October 26 (ROCK PRODUCTS, November, p. 63). The plant was valued at $100,000.

Resumes Production

CERAMIC FELDSPAR CO., Bath, Me., has been operating for several months the plant formerly owned by the Cummings Feldspar Co., which had been closed for several years. Officers of the new company are Richard Wainford, Trenton, N. J.; Thomas J. Cummings, treasurer and general manager; Charles Wainford, superintendent. Shipments of pulverized feldspar have been made to England, Germany and Canada, as well as to various points on the Eastern seaboard.

Dinner in Mine

BEST BROS. KEENE'S CEMENT CO., Medicine Lodge, Kan., recently entertained the members of the Pratt, Kan., Chamber of Commerce at dinner in its gypsum mine near Sun City, Kan. The company is completing its four 1000-ton warehouse at Medicine Lodge to take care of special cements and plasters.

Lime Manufacturer Honored

WILLIAM E. CARSON, president, Riverton Lime and Stone Co., Riverton, Va., on the occasion of his recent trip to Europe was honored while in England by election as a fellow of the British Scientific and Industrial Research Society, in recognition of his valuable research work in the field of lime, lime products and other cementitious materials.

New Mill

ANACONDA PHOSPHATE MINING CO., Garrison, Mont., has recently completed a new rock phosphate grinding plant a few miles west of Garrison on Highway No. 10. Rock is ground to 200-mesh and air separated.

New Crushing Plant

W. C. LONG & CO., contractors, Big Stone Gap, Tenn., have purchased a rock crushing plant at Big Laurel, Va., which has a capacity of about 250 tons daily.

HINTS AND HELPS FOR SUPERINTENDENTS

Strengthening Old Shovel Detail

By C. H. Wright
Snyder, N. Y.

THE SKETCH shows how I have saved repairs on an old shovel, by use of two 2-in. hook bolts to hold the swinging sheave casting on its foundation. These bolts are hooked through a 4½-in. cored hole at the bottom of the casting and are held to the lower flange of the 15-in. I-beam, with 1¼-in.x6-in. strap, but in such a manner that it fits the flange perfectly, making it very firm.

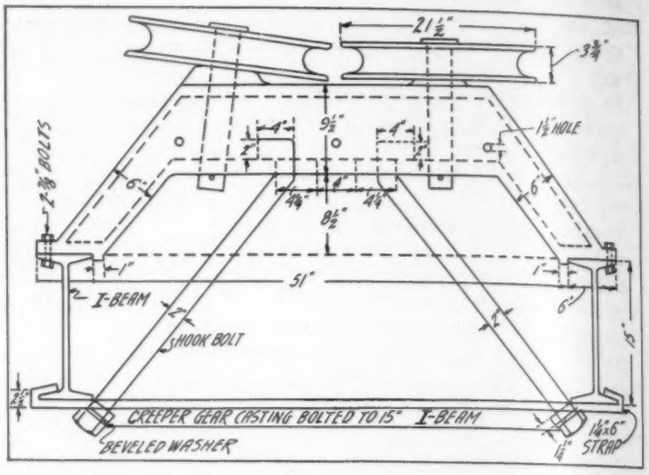
Without these hook bolts it is almost impossible to hold this swinging sheave casting in its proper position for a very long period of time, as the four ⅞-in. bolts, two at each end, do not mean much more than doll pins, and these very often break, meaning that it is quite a task to replace them, because this portion of the casting is covered by the operator's platform, which makes it very difficult to replace bolts and tighten them.

Looking at the drawing one will notice that there are three 1½-in. holes through the casting, which simply mean that this casting is bolted to the A-frame bed casting with a pipe spreader between it and the casting. These do not help to hold the swinging casting down in its place, but when the ⅞-in. bolts break at the end of the casting, these bolts often either break or bend.

Some years ago these hook bolts were installed and in that length of time I can safely say that we have not experienced any trouble with the ⅞-in. bolts or the three larger bolts that tie the A-frame casting and the swinging sheave casting together, but I can say that perhaps once a year we break one of these 2-in. hook bolts, which shows the great strain there is on them. So we shouldn't expect our ⅞-in. bolts to hold the strain these hook bolts stand.

The bottom flange of the 15-in. I-beam is held very firmly because the cast-steel creeper gear casting is bolted to it with a double row of 1-in. bolts.

Before these two 2-in. holding down hook bolts were installed we experienced untold trouble, the ⅞-in. bolts would break allowing either side of the casting to rise, throwing the cable off the sheaves, and sometimes almost cutting the cable in two, or allowing the heavy boom to smash against the A-frame leg with such force that it would seem almost impossible for the leg to



Hook bolts hold swinging sheave casting in place

One must be sure to keep the nuts very tight on the end of the hook bolts and not allow the casting to move, as this movement will have a tendency to weaken the hook end on the bolt.

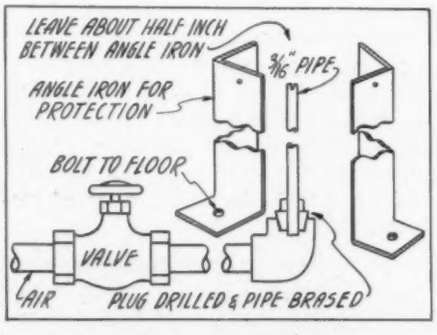
Drill Steel Cleaning Device

By Charles Labbe
Goldfield, Nev.

IN A WESTERN MINE where plugged drill steel caused much delay at the blacksmith shop, a simple and efficient drill cleaner was made, to eliminate the loss of time.

Air pressure is piped in a ½-in. line to a spring valve controlled by the operator's foot. To the end of this ½-in. pipe is connected a ½-in. elbow, then the cleaner itself, a piece of 3/16-in. o.d. steel pipe about 3 ft. long (for 6-ft. drills); for the easy removal of this small pipe, a ½-in. pipe plug is drilled the size of the pipe and the pipe brazed to it.

The operation of the cleaner is simple: the plugged drill is slipped over the small pipe, the air valve opened, the drill being held and rotated by hand, while the air blowing at the same time expels the dust or mud from the hole in the drill; if the drill hole is not opened, the drill is turned over and cleaned the same way until clear.



Simple drill cleaning device

The end of the pipe being so small that it is not worth while to give it any particular shape, as it soon wears smooth, the best if any is a shallow hacksaw cut across the end.

To protect the cleaning pipe from outside damage, two pieces of 2-in. angle iron, somewhat longer than the pipe, were fastened at the top by some small piece of strap iron, while at the lower end one side of each is bent square, drilled and fastened with lag-screws or bolts to a 2 x 12-in. floor.

This 3/16-in. outside diameter steel pipe comes in two wall thicknesses: 1/32 and 1/16-in. As water under pressure can be used as well as compressed air, the larger the hole, the better.

The hole in the drill steel being a trifle larger than ¼ in., a 3/16-in. pipe will go in freely. The hole at the shank and at the bit must be kept full size, as any restriction is also very often a cause of plugging.

Loud Speaker for Ready-Mixed Orders

KEEFNER CONCRETE CO., Des Moines, Iowa, has recently installed a loud speaker system between the plant office and ready-mixed concrete plant 600 ft. away. The system consists of a microphone-amplifier-loud speaker system made by River Electric Laboratories, Cincinnati, Ohio.

The microphone in the plant office is placed on the counter where orders are made out. The return, or speaker from the plant, is mounted in an out-of-the-way place on a shelf above the

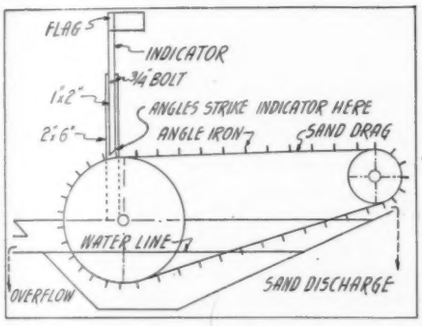
door. The system is connected to the regular 110-volt circuit, and wires run over the line posts to the ready-mix plant.

Here the speaker and microphone are located on the proportioning floor where messages will be easily heard. The office generally gives out orders for ready-mix, proportions, etc., over the system and the foreman at the other end repeats these over the system, verifying the message. Each of the two sets has an adjustable volume control.

Sand Drag Indicator

By Dare Paris
Monrovia, Calif.

AN INDICATOR on a sand drag, a simple but efficient device shown in the accompanying sketch, has proved to be a great help to the plant man as it can be seen from anywhere on the plant and from the ground. It consists of 1-in.x2-in. strip bolted or rather pivoted to a 2-in.x6-in. run up to a



Flag reports if drag is working

height that can be plainly seen. When the drag is running, the angle iron passing by strikes the 1x2-in. stick causing it to work back and forth indicating that the drag is O.K. If the drag stops, the flag of course drops down horizontally. Contrivances of this kind can save costly shutdowns; and the cost of installing is practically nothing.

View of 82-ft., two-pump dredge of Roquemore Sand and Gravel Co.

Two-Pump Dredge

IN CHANGING over from a dragline to a dredge pump, the Roquemore Sand and Gravel Co., Montgomery, Ala., tried to provide for economical operation at low capacities as well as high. The 26x82 ft. all-steel dredge hull was moved from Flomation, Ala., where it had been producing, equipped with a 15-in. Amsco dredge pump.

However, in its new location it was not expected to require immediately anywhere near that capacity. So an 8-in. Amsco dredge pump was mounted in the bow, powered by a 150-hp. G.-E. motor. The suction end was connected to the cutter, and its discharge goes through the dredge to the stern.

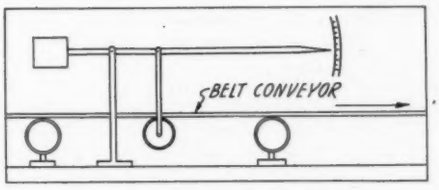
The 15-in. pump with its 400-hp. G.-E. motor is mounted on the stern in line with the 8-in. pump, and its suction pipe runs forward toward the cutter but is not connected to it. The 8-in. discharge pipe (the part on the dredge) runs through this 15-in. suction pipe.

The 8-in. pump operating full time can supply the present demand. When business improves, the 8-in. pipe can be taken out and the 15-in. pipe connected to the cutter and, with an elbow, to the 15-in. pump. Electrical connections are interchangeable, so that the change can be made in one day's time.

Conveyor Load Indicated

WHILE there are several well known manufactured devices for measuring and recording the load carried on belt conveyors, an accurate measurement, such as these give, may not be required: Maybe all that is required is an estimate, or a knowledge that the belt is operating efficiently.

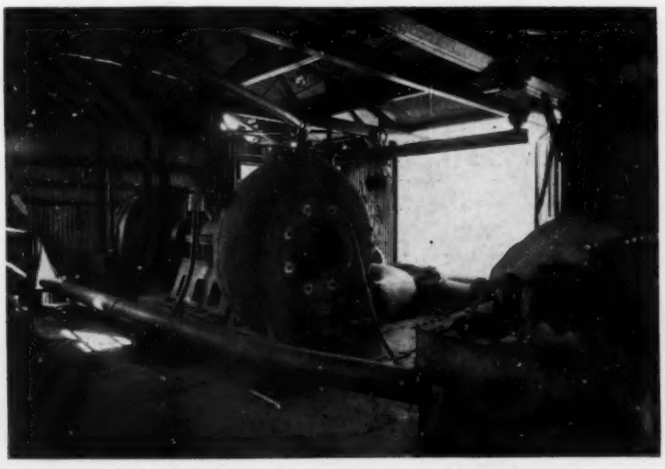
A west coast rock products plant has such a homemade device. A carrier roll is hung from a balanced lever and



Lever estimates belt load

about midway between two of the permanent carrier rolls. The weight of the suspended roll and lever is offset by weights as shown in the sketch.

A heavy load depresses the belt of the conveyor downward—the heavier the load, the greater this depression; and the amount of this depression is indicated on a dial conveniently mounted so the operator can estimate the tonnage carried.



Left, the 8-in. pump at front of dredge, and, right, the 15-in. pump at the back, alternated to suit required capacity

Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked	Dividends	
Allentown P. C., com.[47]	11-27-36	5	7		
Allentown P. C., pfd.[47]	11-27-36	8	10		
Alpha P. C., com.	11-20-36	32½	32⅞	.25(qu.)	Dec. 21
American Aggregates, 1st mtg. 3/6's, 1943, new bonds[48]	11-18-36	50	53		
American Aggregates, 6's, 1943, old[48]	11-18-36	50	..		
American Aggregates, com.[48]	11-18-36	1½	2½		
American Aggregates, pfd.[48]	11-18-36	4	..		
Arundel Corp., com.	11-24-36	18¾	actual sale		
Ash Grove L. & P. C., com.[47]	11-27-36	14	15		
Ash Grove L. & P. C., pfd.[47]	11-27-36	98	100		
Bessemer L. & C., cert. of dep., 1947[46]	11-18-36	116	..		
Bessemer L. & C., com.[47]	11-27-36	10	11		
Bessemer L. & C., pfd.[47]	11-27-36	39	41		
Bessemer L. & C., 6's, 1955[50]	11-27-36	89	91		
Bessemer L. & C., 1st 6½'s, 1947[45]	11-18-36	80	..		
Boston S. & G., com.[37]	11-18-36	1	2		
Boston S. & G. 7% pfd.[37]	11-18-36	7	10		
Boston S. & G., 7's, 1939[37]	11-18-36	75	..		
Calaveras Cement, com.[49]	11-14-36	7¾	8		
Calaveras Cement, 7% pfd.[49]	11-14-36	100	..	1.00(ac.)	Dec. 1
California Art Tile, A[9]	11-14-36	21	22	.50(ac.)	Dec. 1
California Art Tile, B[9]	11-14-36	3½	4½		
Canada Cement, com.[42]	11-18-36	14¾	14½		
Canada Cement, pfd.[42]	11-18-36	99	100		
Canada Cement, 5½'s, 1947[42]	11-18-36	104	..		
Canada Cement, 4¼'s, 1951[42]	11-18-36	104	104¾		
Canada Crushed Stone, 6½'s, 1944[42]	11-18-36	95	..		
Consol. Cement, 1st 6's, 1950[50]	11-21-36	93½	95		
Consol. Cement, A[50]	11-21-36	8¾	9¼		
Consol. Okla. S. & G., 6½'s, 1948[43]	11-18-36	18	..		
Consol. S. & G., pfd.[43]	11-18-36	42	..		
Consol. Rock Products, units[47]	11-27-36	90c	1		
Construction Mat., com.[47]	11-27-36	20c	30c		
Construction Mat., pfd.[47]	11-27-36	1	1½		
Consumers Rock & Gravel, 1st mtg. 6½'s, 1948[47]	11-27-36	35	38		
Coosa P. C., 1st 6's[47]	11-27-36	42	..		
Coplay Cement Mfg., pfd.[47]	11-27-36	15	17		
Coplay Cement Mfg., 6's, 1941[47]	11-27-36	97	100		
Cumberland P. C., 7's, 1937[47]	11-27-36	97	100		
Cumberland P. C., pfd[50]	11-27-36	45	47		
Dewey P. C., com.[47]	11-27-36	55	60		
Dolese & Shepard[47]	11-23-36	37	40		
Federal P. C., 6½'s, 1941[47]	11-27-36	55	60		
Fla. P. C., units[47]	11-27-36	35	36		
Fla. P. C., 6½'s, 1937[46]	11-18-36	101	102		
Giant P. C., com.[50]	11-21-36	5½	6½		
Giant P. C., pfd.[50]	11-21-36	29	31		
Gyp., Lime & Alabastine, Ltd.	11-20-36	12½	13⅝		
Gyp., Lime & Alabastine, 5½'s, 1948[47]	11-27-36	100	102		
Hawkeye P. C., cap.[47]	11-27-36	33	36		
Hercules Cement, com.[47]	11-27-36	37	40		
Hercules Cement, pfd.[47]	11-27-36	95	98		
Hermitage Cement, com.[47]	11-27-36	16	18		
Hermitage Cement, pfd[47]	11-27-36	103	106		
Ideal Cement, com.[50]	11-24-36	95	98		
International Cement, conv. deb. 4's, 1945	11-20-36	164½	170		
Kelley Island L. & T.	11-20-36	27½	28½	.25(qu.) .25(ex.)	Dec. 15 Dec. 15
Ky. Cons. Stone, 6½'s, 1938[47]	11-27-36	25	30		
Ky. Cons. Stone, com.[47]	11-27-36	1	2		
Ky. Cons. Stone, pfd.[47]	11-27-36	3	5		
Ky. Cons. Stone, 1st mtg., 6½'s[46]	11-18-36	20	25		
Ky. Rock Asphalt, 6½'s, 1936[47]	11-27-36	30	35		
Lawrence P. C., com.	11- 6-36	37	39		
Lawrence P. C., 5½'s, 1942[50]	11-21-36	101	..		
Lehigh P. C., com.	11-20-36	43	43¾		
Lehigh P. C., 4% pfd[47]	11-20-36	170	179		
Lone Star Cement, com.	11-20-36	58¾	59½	.50(qu.) .75(ex.)	Dec. 21 Dec. 21
Louisville Cement[47]	11-27-36	100	105		
Lyman-Richey, 1st 6's, 1935[50]	11-21-36	50	..		
Marbelite Corp., com[40]	11-14-36	40c	60c		
Marbelite Corp., pfd.[40]	11-14-36	4¼	4¾		
Marblehead Lime, 7's, 1944[34]	11-18-36	96	100		
Marquette Cement, com.[50]	11-21-36	34	40		
Marquette Cement, pfd.[50]	11-21-36	98½	..		
Material Service Corp.[47]	11-27-36	9	10		
McCrady-Rodgers, com.[47]	11-27-36	7	8		
McCrady-Rodgers, 7% pfd.[47]	11-27-36	35	40		
Medusa P. C., com.	11-20-36	40¼	40⅞		
Medusa P. C., pfd.[47]	11-27-36	70	75		
Michigan L. and C., com.[47]	11-27-36	45	47		
Minnesota Mining & Mfg. Co.	11-21-36	38¾	actual sale		

Stock	Date	Bid	Asked	Dividends	
Missouri P. C.	11-24-36	18	19		
Monarch Cement, com.[47]	11-27-36	100	105		
Monolith P. C., com.[9]	11-14-36	3	3½		
Monolith P. C., 8% pfd.[9]	11-14-36	6¾	7¾	.80(ac.)	Dec. 15
Monolith, P. C., units[9]	11-14-36	16½	18		
Monolith P. C., 1st mtg.[9]	11-14-36	104	105½		
Monolith Portland Midwest, pfd.[9]	11-14-36	2¼	2½		
National Gypsum, A, com.[47]	11-27-36	56	58	2.50 stk. div.	Dec. 21
National Gypsum, 1st pfd.[47]	11-27-36	103½	104½	1.75	Dec. 22
National Gypsum, 2nd pfd.[47]	11-27-36	15½	17	.25	Dec. 22
National L. & S., 6½'s, 1941[47]	11-27-36	95	99		
Nazareth Cement, com.[47]	11-27-36	8	9		
Nazareth Cement, pfd.[47]	11-27-36	65	70		
Newaygo P. C., 7% cum. pfd.[47]	11-27-36	75	85		
New England Lime, units[34]	11-18-36	15	20		
N. Y. Trap Rock, 1st 6's, 1946	11-20-36	88	89		
N. Y. Trap Rock, 6's, stamped, 1946	11-20-36	91¾	92		
N. Y. Trap Rock, 7% pfd.[46]	11-18-36	50	55	6.25 6.00	Nov. 30 Jan. 1
North Amer. Cement, 1st 6½'s, 1953[50]	11-21-36	55½	58		
North Amer. Cement, 6½'s, 1943[50]	11-21-36	98	..		
North Amer. Cement, 6½'s, 1940[50]	11-21-36	72	..		
North Amer. Cement, "A" pfd.	11-23-36	9½	11½		
North American Cement "B"[47]	11-27-36	11	12		
North Shore Mat. 1st 6's[47]	11-27-36	42	48		
Northwestern P. C., units[9]	11-14-36	55	60		
Northwestern States P. C.[47]	11-27-36	24	26		
Ohio River S. & G., com.[50]	11-27-36	1	..		
Ohio River S. & G., 1st pfd.[50]	11-27-36	77	..	5.00	Dec. 1
Ohio River S. & G., 2nd pfd.[50]	11-27-36	5	..		
Ohio River S. & G., 6's[46]	11-18-36	10	20		
Oregon P. C., com.[47]	11-27-36	4	5		
Oregon P. C., pfd.[47]	11-27-36	96	98		
Oregon P. C., conv. pfd.[47]	11-27-36	50	55		
Pacific Coast Agg., new com.[40]	11-14-36	3¼	3¾		
Pacific P. C., com.[40]	11-14-36	4⅞	5½		
Pacific P. C., pfd.[40]	11-14-36	49½	52½		
Peerless Cement, com[50]	11-21-36	7½	7⅞		
Penn.-Dixie Cement, com.	11-20-36	7½	7⅝		
Penn.-Dixie Cement, pfd.	11-20-36	62	65		
Penn.-Dixie Cement, 6's, A, 1941	11-20-36	98½	100		
Penn. Glass Sand Corp., com.[47]	11-27-36	20	21	.50(init.)	Dec. 15
Penn. Glass Sand Corp., pfd.[47]	11-27-36	120	124	1.75(qu.)	Jan. 1
Penn. Glass Sand Corp., 1st Mtg. 4½'s, 1960	11-20-36	104½	105		
Petoskey P. C., 6's, 1935-38[45]	11-18-36	97	..		
Petoskey P. C., 6's, 1941[46]	11-18-36	95	..		
Petoskey P. C., com.[50]	11-27-36	10¾	11½		
Republic P. C., 6's, 1943[50]	11-21-36	103	..		
Riverside Cement, A[9]	11-14-36	15	15¾	1.36¼(ac.)	Dec. 1
Riverside Cement, B[9]	11-14-36	1	1½		
Riverside Cement, pfd.[9]	11-14-36	102	105		
Santa Cruz P. C., pfd.[9]	11-14-36	45	50		
Schumacher Wallboard, com.[9]	11-14-36	4½	5		
Schumacher Wallboard, pfd.[9]	11-14-36	18	19		
Signal Mt. P. C., units[50]	11-21-36	60	..		
Southwestern P. C., units[40]	11-14-36	115	..		
Spokane P. C., units[47]	11-27-36	11	13		
Standard Pav. & Mat. (Can.), com.[42]	11-18-36	3⅝	3¾		
Standard Pav. & Mat., pfd.[43]	11-18-36	26½	27		
Superior P. C., A[40]	11-14-36	42½	45	.27½(ac.)	Dec. 1
Superior P. C., B[40]	11-14-36	15	..		
Trinity P. C., units[47]	11-27-36	45	50		
U. S. Gypsum, com.	11-20-36	114⅛	117	.50(qu.) 1.25(ex.)	Dec. 31 Dec. 24
U. S. Gypsum, 7% pfd.	11-20-36	164	..	1.75(qu.)	Jan. 2
Volunteer P. C., 1st 7's, 1942[47]	11-27-36	98	100		
Volunteer P. C., units[47]	11-27-36	5	6		
Vulcanite P. C., com.[47]	11-27-36	8	10		
Vulcanite P. C., 7½'s, 1943[47]	11-27-36	98	100		
Wabash P. C.[47]	11-27-36	10	11		
Warner Co., ww, 1st 6's, 1944[47]	11-27-36	84	86		
Warner Co., com.[47]	11-27-36	7	9		
Warner Co., pfd.[47]	11-27-36	17	19		
Whitehall Cement Mfg. com.[47]	11-27-36	50	52		
Whitehall Cement Mfg., pfd.[47]	11-27-36	49	51		
Wisconsin L & C., 1st 7's, 1940[47]	11-27-36	85	90		
Wolverine P. C., com.[47]	11-27-36	7	8		
Yosemite P. C., A com.[40]	11-14-36	6½	7		

Quotations by: [9]A. E. White Co., San Francisco, Calif. [34]The Securities Co. of Milwaukee, Inc., Milwaukee, Wis. [37]Wise, Hobbs & Seaver, Inc., Boston. [40]Martin Judge, Jr., and Co., San Francisco, Calif. [42]Nesbitt, Thomson & Co., Toronto. [43]First National Bank of Chicago, Chicago, Ill. [47]Anderson Plotz and Co., Chicago, Ill. [48]Hewitt, Ladin & Co., New York, N. Y. [50]Rogers & Tracy, Inc., Chicago, Ill.

Auction Sale

Five shares Birnie Sand & Gravel Co., com. and 80 shares Birnie Sand & Gravel Co., pfd. (par $10), included with 24 shares Consolidated American Royalty Corp., com.; 10 shares Rolls-Royce of America, pfd. (par $100); and 110 shares Manufacturers Machine Co., com., in a sale at auction at Boston, Mass., November 11, the lot being sold for $20.

Recent Dividends Announced

Alpha P. C. (quar.)	$0.25	Dec. 21, 1936
Calaveras Cement 7% pfd. (This leaves arrears of $10.25.)	1.00	Dec. 1, 1936
California Art Tile, A (accum.)	.50	Dec. 1, 1936
Kelley Island L. & T. (quar.)	.25	Dec. 15, 1936
(extra)	.25	Dec. 15, 1936
Lone Star Cement, com. (quar.)	.50	Dec. 21, 1936
(extra)	.75	Dec. 21, 1936
Monolith P. C., pfd. (This leaves arrears of $2.95)	.50	Dec. 15, 1936
National Gypsum Co., 7% 1st pfd. (quar.)	1.75	Dec. 22, 1936
5% 2nd pfd. (quar.) (On A and B com., a stock dividend of $2.50 of 2nd, pfd. is payable Dec. 21)	.25	Dec. 22, 1936
New York Trap Rock com.	.25	Nov. 30, 1936
$7 cum. pfd.	6.25	Nov. 30, 1936
$7 cum. pfd.	6.00	Jan. 1, 1937
Ohio River S. & G. 7% cum. 1st pfd.	5.00	Dec. 1, 1936
Penn. Glass Sand, com. (init.)	.50	Dec. 15, 1936
pfd. (quar.)	1.75	Jan. 1, 1937
Riverside Cement, Class A, pfd. (accum.) (This leaves arrears of $4.68¾.)	1.36¼	Dec. 1, 1936
Superior P. C., Class A. (This leaves arrears of $2.75.)	.27½	Dec. 1, 1936
U. S. Gypsum, com. (quar.)	.50	Dec. 31, 1936
(extra)	1.25	Dec. 24, 1936
U. S. Gypsum, pfd. (quar.)	1.75	Jan. 2, 1937

GIANT PORTLAND CEMENT CO., Egypt, Penn., has withdrawn its plan for recapitalization (ROCK PRODUCTS, November, p. 57). The following statement was issued: "At a special meeting of the board of directors, recapitalization plan to be acted upon by stockholders on November 16, was ordered to be withdrawn. This was necessary by reason of the decision of the Delaware Supreme Court in overruling the decision of the lower court in the Kellery, Rives-Wilson & Co., Inc., case." The Delaware decision was to the effect that preferred dividend arrearages could not be discharged by a stock issue.

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REPUBLIC PORTLAND CEMENT CO., San Antonio, Tex., directors have authorized issuance of refunding 5% participating cumulative $100 par preferred stock in exchange for approximately 95% of the existing 7% cumulative preferred stock, in compliance with a plan adopted by stockholders on September 10, 1936. As of June 1, 1936, there was $15.75 per share, or a total of $171,518, in arrears on the 7% preferred.

Holders of each share of 7% preferred stock will receive one share of new 5% preferred. In respect to the dividend arrears to September 1, 1936, holders will receive $6 per share in cash and the remaining $8 of arrearage in 5% preferred stock at rate of $100 par value per share. The 1610 shares of 7% preferred stock in company's treasury will be cancelled and re-issued as refunding stock to be used for liquidating the accrued dividends.

Before any dividends are payable on the common stock, there shall first be paid to holders of the 5% preferred, $1 per share in addition to the regular 5% cumulative annual dividend, and an additional $1 per share for each share of preferred shall be placed in a sinking fund for retirement of the preferred.

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KENTUCKY STONE CO., Louisville, Ky., operator of the plants formerly owned by the defunct Kentucky Consolidated Stone Co., reports a balance sheet as of August 31, 1936, as follows:

Assets:	
Plants, equipment, etc.	$345,839
Limestone deposits	54,295
Current Assets:	
Cash	33,802
Accounts receivable (net)	154,057
Stone in process and storage	19,001
Deferred assets, etc.	40,281
Total	$647,277
Liabilities:	
Common stock (par $1)	$ 7,750
5% mortgage including bonds (2nd mortgage)	232,500
Current Liabilities:	
Accounts payable, etc.	34,619
Accruals	5,227
Deferred liabilities (RFC 1st mortgage)	75,000
Reserve for depreciation and depletion	8,130
Capital surplus	265,786
Undivided profits	18,265
Total	$647,277
Current assets	$206,861
Current liabilities	39,846
Working capital	167,015

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CONSOLIDATED CEMENT CORP., Chicago, Ill., reported for the six months ended June 30, 1936:

Net sales	$587,444
Cost of goods sold	352,467
Gross profit on sales	$234,977
Selling, general and administrative expenses	140,838
Mill overhead applicable to non-operating periods	25,393
Expenses of Mildred, Kan., plant, not in operation	16,654
Net profit from operations	$ 52,091
Other income	7,420
Net profit before interest & other deductions	$ 59,511
Interest on 15-year 1st mortgage 6% cumulative-income bonds	54,169
Interest on 15-year 6% cumulative income notes	6,188
Bond discount and expense	5,396
Loss on retirement of fixed assets, operating of dwellings, etc.	4,781
Net loss	$ 11,023

Charges to profit and loss account and to costs of cement produced for the six months ended June 30, 1936, for depreciation and depletion were $67,198.

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YOSEMITE PORTLAND CEMENT CO., Merced, Calif., stockholders voted overwhelmingly in favor of the management's proposed capital reorganization plan. Vote on the plan was 166,176 shares of A stock in favor of the recast, against 1,520 shares opposed, and 112,480 shares of B stock to none opposed. The vote represents 75% of 221,451 outstanding A shares and 80% of outstanding 112,480 B shares as favoring the plan.

Terms of Yosemite's revamping proposal include the issuance of 270,000 shares of $10 par 4% preferred stock in exchange for outstanding A shares and A stock accumulations, restatement of B stock par from $10 to $1 a share and payment to non-converting A holders of pro rata share in current earned surplus.

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ALBERENE STONE CORP. OF VIRGINIA, Charlottesville, Va. (talc and soapstone), reports earnings for the six months ending June 30:

	1936	1935
Net sales	$184,432	$190,384
Cost of sales	114,006	109,539
Selling, general and administrative expense	42,844	37,266
Depreciation and depletion	12,168	4,502
Taxes	5,425	5,345
Net earnings	9,989	33,732
Other income	8,878	6,748
Total income	18,868	40,480
Interest	200	1,250
Net income	18,668	39,230
Earned per share	$0.28	$0.58

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NORTH AMERICAN CEMENT CORP., Albany, N. Y., reports for 12 months ended September 30, 1936, net loss of $96,279 after taxes, depreciation, depletion, interest and amortization, comparing with net loss of $438,112 for the 12 months ended September 30, 1935.

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PACIFIC COAST AGGREGATES, INC., San Francisco, Calif., reports for the nine months ended September 30, 1936, a consolidated net profit of $21,011 after depreciation, depletion and proportionate share of a non-consolidated subsidiary's loss, but before provision for income taxes. A comparison with the corresponding 1935 period is not available. Results of operations by quarters for the first nine months this year follow: First quarter, $42,273 net loss; second quarter, $17,343 profit, and third quarter, $45,941 net profit.

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NATIONAL GYPSUM CO., Buffalo, N. Y., reports for the three months ended September 30:

	1936	1935
Net income after charges and Federal income taxes	$389,049	$102,333
Earned per share, class A.	*1.31	$0.38
Earned per share, class B.	*1.31	(d)1.01
9 months to Sept. 30	$799,317	$398,535
Earned per share, first preferred	$22.77	$15.16
Earned per share, second preferred	24.42	10.34
Earned per share, class A:		
Priority basis	2.60	1.85
Participating basis	2.44	1.66
Earned per share, class B.	2.44	1.66
Number of 7% preferred shares	35,110	26,296
Number of 5% preferred shares	25,184	25,184
Number of class A shares.	229,596	130,463
Number of class B shares.	15,000	15,000

*On participating basis.

Note: No provision made for Federal surtax on undistributed profits.

TRAFFIC and TRANSPORTATION

Proposed Rate Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of November 21:

New England

40374. **Waste stone,** West Rutland, Vt., to Waltham, Mass. Proposed—$1.70 net ton on shipments manufactured at Waltham and reshipped by rail; $1.80 net ton on shipments where manufactured product is not reshipped by rail; minimum weight 80,000 lb. Reason—To establish another source of supply for a new industry located at Waltham.

40407. **Stone,** natural (other than bituminous asphalt rock); rip rap, rubble, chips, dust, grit or waste; crushed, ground or powdered, minimum weight 70,000 lb., Swanton, Vt., to destinations in Official territory. Proposed, column 18. Reason: To establish reasonable rating to permit marketing at Swanton, Vt.

Trunk

35251 (Sup. 1). **Stone,** crushed, coated, C. L., (See Note 2), from Security, Md., to Charleston, W. Va., $2.50 per net ton.

35318. To cancel obsolete rates from B. & O. R. R. tariffs on stone and sand from and to various points.

35319. To add Chulasky, Penn., as an origin point to the Danville, Penn., Group, on sand and gravel at rates prescribed in the Industrial Sand Case under I. C. C. Docket 22907.

35337. To cancel rates on slag, C. L., from Palmerton and Palmerton (Delaware Ave.), Penn., to points in Trunk Line territory published in L. & N. E. R. R. Tariffs I. C. C. A-6133 and A-6134.

35338. **Barytes,** crude, lumped or jigged, C. L., (See Note 2), from Troutville, Va., to Bridgeton, N. J., and from Candler and Lone Jack, Va., to Jersey City, N. J., and Long Island City, N. Y., $4.80 per gross ton.

35342. To cancel rates of $1.0b and 90c per net ton on slag, commercial crushed, C. L., in bulk, in open-top equipment, from Dunbar, Penn., to Rivesville, Grant Town, North Fairmont, Fairmont and Rivesville Jct., W. Va., published in B. & O. R. R. I. C. C. 22882.

Central

48769. To establish on **industrial sand,** C. L., min. wt. per Item 30 of N. Y. C. Tariff I. C. C. LS-1855, from Amherst, Ceylon and Huron O., to Van Wert, O., 130c per net ton. (Applies only in open-top cars—in closed cars rate will be 115% of open-top car rate).

48773. To establish on **carbonate of lime,** C. L., min. wt. 40,000 lb., from Mosher, Mo., to Boston, Mass., and New Haven, Conn., 38c.

48776. To establish on **sand** (except industrial), and **gravel,** C. L., to Sardinia, Ind., from Reddington, 40c, and Terre Haute, Ind., 80c per net ton.

48788. To establish on **fullers earth,** C. L., from Olmsted, Ill., to Cleveland, O., 600c minimum weight 40,000 lb. and 480c per net ton, minimum weight 70,000 lb., subject to emergency tariff.

48836. To establish on **core sand,** C. L., from the Vassar groups—Vassar, Wampson, McHale and Juniata, Mich.—to Lockport, N. Y., 200c in open top cars and 210c per net ton in closed cars.

*Note—The oil, tar and/or asphaltum not to exceed 10% by weight of the commodity shipped, the shipper to so specify on shipping orders and bills of lading.

48860. To establish on **dolomite,** roasted (refractory dolomite, in granular form, treated or untreated, clinkered and burned to a dead state), C. L. (See Note 3), from Narlo, O., to Indianapolis, Ind., 210c per net ton.

48875. To cancel rates on **limestone,** C. L., in Items 4540, 4550, 4560 and 4570 of C. F. A. L. Tariff 179-O, from points in Ohio and Pennsylvania to Cleveland, Newburg and Newburg (93rd St.), Ohio; also to cancel rate of 113c per net ton in Item 2590, on **limestone,** crushed; **stone,** broken; **stone dust; stone,** ground, C. L., from Sharon, Penn., to Alliance, Ohio. Classification basis to apply.

48888. To establish on **fluxing stone,** furnace or foundry, melting and refractory, unburned, in bulk, C. L., from Carey, O., to Parma, O., 90c per gross ton.

48907. To establish on **sand** (except naturally bonded moulding; ground or pulverized), C. L., from Grand Haven, Muskegon and Rosy Mound, Mich., to Ecorse, Mich., 145c; Jackson, 270c; Lima, 185c, and Springfield, O., 230c per net ton, in open cars; to Ecorse, Mich., 180c; Jackson, 270c; Lima, 200c. and Springfield, O., 230c per net ton in closed cars.

48923. To establish on **sand** (except industrial), and **gravel** C. L., in open top cars, from LaFayette, Ind., to Lebanon, Ind., 55c.

48924. To establish on **fuller's earth,** C. L., from Olmsted, Ill., to Bloomfield, N. J., 860c, minimum weight 40,000 lb. (see note), and 680c per net ton, minimum weight 70,000 lb., subject to emergency charges.

48931. To establish on **crushed slag** or **crushed commercial slag** (other than granulated), in open top cars, C. L., from Jackson, O., to Gallipolis, 85c; Hartleyville, Kanauga, Modoc, O., 90c, and Pomeroy, O., 95c per net ton.

Southern

11504 (Amdt. 1). To establish **transit privileges on mussel shells,** C. L., minimum 50,000 lb., at Memphis, Tenn., when originating at points in Oklahoma for cleaning, grading, sorting, and/or storing and reshipment to destinations in Iowa, on basis protection through rate from origin to destination, plus transit charge of 2½c cwt.

13051. **Phosphate rock sinter,** C. L., minimum 80,000 lb. Established 120c net ton Mt. Pleasant, Tenn., district to Sheffield, Ala.

13058. **Limestone,** ground, in bags or barrels, C. L., minimum 30 net tons. Cancel, as obsolete, rates from Norfolk and Suffolk, Va., to Wanchese Line landings published in Nor. Sou. R. R. I. C. C. A-693. Combination rates to apply.

13069. **Fullers' earth,** in packages or in bulk, C. L. Minimum 60,000 lb. Establish 720c net ton—Ochlocknee, Ga., to Port Arthur, Tex.

13110. **Phosphate rock,** ground or pulverized, not acidulated or ammoniated, C. L., minimum 40,000 lb.—Amend Item 570, S. W. L. Tariff 173-H, by providing 12th Class rating from points in S. F. A. Territory to points in Southwestern and Kansas-Missouri Territory.

13131. **Oyster shells,** C. L., per Item 230, Agent Emerson's Tariff 9E. Establish from Bayou La Barte, Ala., Berwick, La., Biloxi, Gulfport, Miss., Houma, La., Mobile, Ala., Morgan City, Ala., New Orleans, La., Pensacola, Fla., to Brussels, Clifford, Mt. Forest, Ont., 53½c, to Clinton, Drayton, Palmerton, Ont., 53c cwt.; also establish from Apalachicola, Fla., to same destinations rates made 4½c cwt., higher.

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

Western

E-41-185. **Sand,** silica, C. L., minimum weight 50,000 lb., from Klondike, Mo., to Terre Haute, Ind. (Proposed, 200c per ton of 2000 lb.

D-41-186—Rates, **stone,** rubble (rough, broken, irregular pieces, not machined or tooled), **stone, rip rap,** C. L. (See Note 3); but not less than 40,000 lb., from Fond du Lac and Lannon, Wis., to Albany, N. Y., Baltimore, Md., Belington, W. Va., Boston, Mass., Cumberland, Md., Hagerstown, Md., Newport News, Va., New York, N. Y., Norfolk, Va., Philadelphia, Penn., Rochester, N. Y., Rockland, Me., Strasburg, Va., Syracuse, N. Y., and Utica, N. Y. Proposed—Cancel commodity rates, allowing class rates to apply.

E-41-187. **Roofing granules,** consisting of stone, slate, sand or gravel, C. L., from Jedburg and Pacific, Mo., to Fulton, N. Y. Proposed, 540c per net ton of 2000 lb. Minimum weight proposed, 80,000 lb.

Southwestern

9754. Cancel Items 846, 847, 849 and 855, S. W. L. Tariff 162-K, I. C. C. 2809, which carry subnormal rates on crushed stone from Bromide, Richards Spur and Springtown, Oklahoma, to Lewisville, Nocona, Point, Lone Oak, Greenville and intermediate Texas points. Standard basis to apply.

9775. **Feldspar,** Lobo, Marfa and Valentine, Tex., to Ft. Smith, Ark., Ada, Okmulgee, Sand Springs, Sapulpa and Tulsa, Okla. Establish rate of $5.25 per net ton of 2000 lb., carloads, minimum 50,000 lb., from Lobo, Marfa and Valentine, Tex.; also Van Horn, Tex., on request, to Ft. Smith, Ark., Ada, Okmulgee, Sand Springs, Sapulpa and Tulsa, Okla.

Texas-Louisiana

9250-3-TX. Gravel from Urbana to Trinity, to amend Item 6751, Supplement TT, Tariff 2-M, to apply on **sand and gravel,** also to cancel Note 2 of that item which provides that the rate will expire with completion of repairs of Highway No. 19 for distance of approximately two miles from Trinity under Federal Aid Project No. 225, but not later than Dec. 31, 1936. Proposed amendment is necessary in order that shipper at Urbana may compete with other producers in the vicinity of Trinity.

9738-TX. **Feldspar.** To establish rates in cents per ton of 2000 lb., for application on intrastate, export and coastwise traffic, (except via Panama Canal).

(Not including terminal charges.)

From Lobo, Marfa and Valentine to Houston, Galveston and Texas City: $4.25.

From Llano and Kingsland to Houston, Galveston and Texas City: $2.60.

From Fredericksburg to Houston, Galveston and Texas City: $3.00.

From Lobo, Marfa and Valentine to San Antonio: $3.50.

From Llano and Kingsland to San Antonio: $2.20.

From Fredericksburg to San Antonio: $1.80.

From Lobo, Marfa and Valentine to Corpus Christi: $4.25.

From Llano and Kingsland to Corpus Christi: $3.00.

From Fredericksburg to Corpus Christi: $3.00.

From Lobo, Marfa and Valentine to Eagle Pass: $3.00.

Interested shippers state that a regular movement of feldspar is scheduled to begin from points named within 90 days, provided equitable rates are established.

10005-TX. To establish rates on **sand and gravel** from Byron, Texas, to points in Texas to which rates are published from

Bois D'Arc, Texas, which are less than standard rates to the same extent as reflected in the rates from Bois D'Arc.

10005-TX. **Sand, gravel and crushed stone** from points in Texas to Greenville: to cancel Item 8130-B. Supplement WW, Tariff 2-M. Standard rates to apply. (See Southwestern 9754.)

Illinois

7829-A. **Chat, chat dust or agricultural limestone**, C. L., to Chicago, Ill., from Bonne Terre, Flat River, Rivermines, Mo. Proposed, $2.05 net ton.

Transcontinental

18516 and Sup. 1. **Roasted dolomite.** Add in Item 1855, Tariffs 1 and 4, Group C and C-1, rate $12.50, and Group ‡A-2, D, and west, rate $11 per ton of 2000 lb., minimum 100,000 lb., to R. B. 1, 2 and 3, rates to expire June 30, 1937. ‡Tariff 1 only.

18872. **Talc, crude**, C. L., to publish carload rate of 65c per 100 lb., minimum weight 80,000 lb., from California points to Group A under Item 4095, Tariff 3.

18908. **Crushed slate**, C. L. Request for carload rate of $10 per ton of 2000 lb., minimum weight 100,000, from Group A territory to Pacific coast points.

Recent I.C.C. Decisions

16372 By division 2. Pennsylvania railroad authorized to establish a rate, **crushed stone and screens**, Buffalo, N. Y., to Kane, Penn., of $1.10 a net ton without observing the long-and-short haul part of section 4. Relief is to apply over the route through Corry and Warren, Penn.

16362. By division 2. The Southern and N. C. & St. L. have been authorized to establish a rate of $1.76 a net ton on **limestone**, ground or pulverized, including stone dust, from Mascot, Tenn., to Nashville, Tenn., over an interstate route to meet an intrastate rate between the same points, without observing the long-and-short haul provision of section 4, subject to the usual conditions as to increasing the present rates from, to and between higher rated intermediate points and lowest combinations of rates.

Reparation on Sand

In a report in No. 27201, Swindell Brothers, Inc., vs. B. & O., and cases grouped therewith, involving rates on **silica sand** from Ottawa, Ill., to Cleveland, Ohio, Elmira, Poughkeepsie, N. Y., and Westfield, Mass.; from Hancock, W. Va., to Baltimore, Md.; and from Mapleton, Penn., to Newark, Ohio, on **naturally bonded molding sand** from origins in the Albany, N. Y., district to Port Chester, N. Y., Westfield and Boston, Mass., Nashua, N. H., and Biddeford, Me., and on both kinds of sand from certain origins in New Jersey to Manlius, N. J., Branford, Conn., and Boston, Mass., the Commission, by division 3, has found some of the rates unreasonable and awarded reparation.

Sand Rates Too High

The **Industrial Silica Corp.** Youngstown, Ohio, recently filed with the state utilities commission a complaint against railroads operating in Ohio, alleging they are charging excessive rates for movement of sand from the company's producing plants at Dundee, Geauga Lake, Phalanx and Warwick. The commission set January 5 for hearing.

The **Pennsylvania Public Service Commission** reports the Pittsburgh Silica Sand Co. recently filed a complaint against "prejudicial" rates charged by the Pennsylvania and the Huntington & Broad Top Mountain railroads for hauling sand from Tatesville.

Lime Rates Reduced

Freight rates on **lime** shipments from Knoxville and Sherwood, Tenn., to all points in Ohio, Indiana, Illinois and West Virginia will be reduced from 15 to 30c per ton after January 28. This decision of the I.C.C. follows complaints filed by the Gager Lime Manufacturing Co. and the Williams Lime Manufacturing Co.

Arkansas Rate Reduction

The Arkansas Corporation Commission has given the Missouri Pacific Lines authority to reduce rates on sand and gravel shipments from Arkadelphia to Fulton, and establish a rate of 60c per ton in order to meet truck competition.

Gravel Rate Record Corrected

The Nebraska Railway Commission, on October 17, modified its records to show a recent order reducing sand and gravel freight rates from various points outside of the Platte river zone to Omaha and Lincoln is still in effect.

On August 28 the commission voted to vacate an order reducing similar rates from the Platte river zone to Omaha and Lincoln, but its secretary, in making up the official record, also included the order on the other points.

The Nebraska commission recently approved Union Pacific railroad application to absorb all of the $7.50 per car switching charge on sand and gravel shipments over the Northwestern railroad at Norfolk. The railroad previously absorbed only $5.

Gypsum Rate Decision

Fourth section relief on **plaster,, plasterboard** and related plaster and **gypsum** articles in straight or mixed carloads, from and to all points in the United States east of the Rocky mountains, was granted by the Interstate Commerce Commission in October.

Bids and Prices

QUINCY, ILL.: Missouri Gravel Co., Moline, Ill., awarded contract for 14,400 cu. yd. maintenance gravel for county highways at $1.97 per cu. yd.

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MADISON, WIS.: Frank W. Raemisch, Madison, low bidder on 700 cu. yd. crushed gravel for surfacing Verona township roads at 50c per cu. yd. f.o.b. plant.

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ALBION, ILL.: James King, West Salem, awarded contract for construction of four sections of gravel road, Bone Gap, at $1.47 per cu. yd. A. L. Montgomery, Albion, awarded contract on three sections of same road at $1.43 and $1.44 per cu. yd.

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COLUMBUS, GA.: County bought carload of portland cement of Camp Concrete Products Co. at $2.66 per bbl. less 10c cash discount. Ten proposals were received, all exactly the same. Award was made by drawing names from a hat.

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EL PASO, TEXAS: Southwestern Portland Cement Co. plant here has been awarded contract for 250,000 bbl. of cement for Conchos flood control dam near Newkirk, N. M., at approximately $700,000, or $2.80 per bbl.

Take Construction Contracts

DUDLEY STONE PRODUCTS CO., El Paso, Texas, has been awarded a contract for 9 miles of crushed gravel surfacing on the James Canyon Forest Highway Route, Lincoln National Forest, New Mexico.

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ARIZONA SAND AND ROCK CO., Phoenix, Ariz., was low bidder for Maricopa County highway work.

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WILLAPA HARBOR QUARRIES, South Bend, Wash., Adolph Gullickson, general manager, has been awarded contract for surfacing 6 miles of Sherman Highway, near Shaniko, Ore.

Sand-Lime Brick Production and Shipments

THE following data are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. They may be considered representative of the industry.

Ten active sand-lime brick plants reported for the month of October, this number being the same as that reporting for the month of September, statistics for which were published in November.

Average Prices for October

Shipping Point	Plant Price	Delivered Price
Pontiac, Mich.	$11.00	$13.00
Grand Rapids, Mich.	11.00	....
Mishawaka, Ind.	9.25	....
Syracuse, N. Y.	14.00	16.00-20.00
Saginaw, Mich.	10.50	....
Sioux Falls, S. D.	12.00	....
Madison, Wis.	11.50	13.00
Watertown, Mass.	....	12.50

Statistics for September and October

	September†	October*
Production	2,915,525	3,814,145
Shipments (rail)	1,016,584	283,500
Shipments (truck)	2,198,792	3,372,086
Stocks on hand	1,835,250	1,969,637
Unfilled orders	1,535,000	2,660,000

† Ten plants reporting; incomplete, four not reporting unfilled orders.

* Ten plants reporting; incomplete, two not reporting unfilled orders.

Sand-Lime Brick Postoffice

A CIRCULAR released jointly by several sand-lime brick companies makes a headline of the fact that 3,000,000 sand lime brick were used in the construction of the United States Postoffice at Detroit, Mich. The building covers one city block and is eight stories high. The companies listed on the circular are Brick and Block, Inc., Detroit,, Mich.; Boice Bros., Pontiac, Mich.; Grande Brick Co., Grand Rapids, Mich.; Michigan Pressed Brick Co., Detroit, Mich.; Northern Indiana Brick Co., Mishawaka, Ind.; Saginaw Brick Co., Saginaw, Mich.; and Sebewaing Sandstone Brick Co., Sebewaing, Mich.

Lime Producers' Forum

Conducted by Victor J. Azbe,
Consulting Engineer, St. Louis, Mo.

Absorption of Moisture by Lime From Air Passing Through Kilns

AMONG questions submitted to this department (to which *all* lime operators are invited to write) is the following:

Inquiry: We are anxious to make a lime of high CaO availability, and somehow we think that through absorption of moisture from the air passing up the kiln cooler the available CaO content is reduced by a considerable amount. Our plant is equipped with a gas producer and all air passes through the cooler, and the lime is drawn cold.

Reply:

(1) Absorption of moisture by lime in the cooler depends on its ability to absorb moisture, which in turn depends upon available time and surface exposed.

(2) It also depends upon the amount of moisture in the air passing up through the cooler. Moisture formed from combustion does not enter the problem, as that is swept upward into the hot zone where lime is incapable of taking up water.

(3) One pound of CaO would require 0.32 pounds of water to be converted to $Ca(OH)_2$. As one pound is 7,000 grains, 2250 grains of water are needed for 100% conversion, or 22.5 grains for 1% conversion.

(4) At 70 deg. F. and 100% humidity, air contains 110 grains of moisture per pound of dry air. At 32 deg. F. it contains 26.5 grains, and at 0 deg. F. and 100% humidity, 5.47 grains.

(5) To burn a pound of coal requires about 11 lb. of air, and as the ratio lime to coal is about 5½ to 1 during regular operation, not including interruptions, we may say that two pounds of air are used per pound of lime.

(6) Of the two pounds, one pound enters the producer to gasify the coal and burn it to CO; the other enters the kiln through the cooler.

(7) It is assumed that half of the moisture in the air is absorbed in the cooler; it is unlikely to be more, for the area of contact and time of contact are both low.

(8) Between the fact that air is ordinarily at 50% humidity, and that only 50% of the remainder is absorbed, then at 70 deg. F. only 27 grains are absorbed in the cooler while at 32 deg. and 0 deg. the respective amounts would be only 6.6 gr. and 1.36 gr.

(9) It thus appears that lime may be impaired to the extent of 1.2% at 70 deg. F., 0.24% at 32 deg. F. and virtually none at zero.

(10) A further proof that moisture in the cooler is not enough of a factor to be responsible for low availability is that small pieces of lime that would absorb moisture more readily appear higher in available CaO than large lumps; also that kilns burning natural gas, where all air comes through the cooler, and this in hot, humid climates, make high CaO lime.

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Fan Capacity Necessary

Inquiry: What capacity blowers are necessary for mixed-feed kilns operating under the forced draft principle? Air to be handled is cold.

Reply: Not considering leakage, the amount of air depends directly upon the amount of coal to be burned and upon the kiln efficiency; and the solution of the problem could be developed about as follows:

To burn carbon requires 11.52 lb. of air per lb. of carbon, which, at standard temperature of volume, represents 142.87 cu. ft.; heat of combustion of pure carbon is 14,544 B.t.u. per lb., according to Haslam in "Fuels and Their Combustion," page 204.

At 100% kiln efficiency, heat necessary to make one pound of CaO is 1378 B.t.u. Volume of air necessary to burn sufficient carbon to produce one pound of lime at this efficiency would then be 13.54 cu. ft., which would vary at different efficiencies as follows:

Kiln efficiency	Air per lb. of lime
100%	13.54 cu. ft.
90%	15.05 cu. ft.
80%	16.95 cu. ft.
70%	19.35 cu. ft.
60%	22.60 cu. ft.
50%	27.08 cu. ft.

From the above the table shown below can be calculated:

Volume requirements for induced draft kilns would be about four times the amount shown, partly due to the high temperature of gases and partially to great dilution through the ordinarily very leaky tops.

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Industry Loses Ideal Superintendent

It is with keen regret we heard that Eugene Pracht, superintendent, Ste. Genevieve Lime Co. plant, is leaving to become connected with the Babcock & Wilcox Co.

The lime industry has not many technically trained engineers, is attracting few, and cannot well spare any. It particularly cannot spare such as Mr. Pracht, who has so splendidly demonstrated his ability. The change wrought in the plant wherein his endeavors were centered were remarkable indeed. A plant of a comparatively ancient era was through the years of his labors modernized and mechanized to a state of high degree. There was no trumpeting about his accomplishments, but we are well aware of them, and as things do they will gradually permeate.

The development was to him an all absorbing interest, and the labor he put in, not only of days, but repeated nights as well, was never equaled by any of the writer's many acquaintances. On parting it behooves that this appreciation be expressed for his contribution towards lifting the lime industry to a higher technical plane. We are reconciled to the loss only through the knowledge of greater opportunities offered Mr. Pracht in his new field.

Wage Increase

STANDARD LIME AND STONE Co., Baltimore, Md., on November 17 announced a 5% wage increase for its Martinsburg, W. Va., plant employes.

FAN CAPACITY DESIRED FOR DIFFERENT KILN CAPACITIES AND EFFICIENCIES

Kiln capacity, CaO tons per day	Kiln Efficiency 80	70	60	50	40	
60	1413	1620	1885	2260	2830	cu. ft., Volume/Minute
50	1180	1350	1575	1890	2360	cu. ft., Volume/Minute
40	945	1080	1260	1510	1890	cu. ft., Volume/Minute
30	707	805	940	1130	1410	cu. ft., Volume/Minute
20	473	540	630	760	945	cu. ft., Volume/Minute

Note of Caution: To allow for possible leakage and excess air, select fan at least 25% larger than given in table.

Absenteeism in the Cement Industry

Because of Both Illness and Accidents

By A. J. R. CURTIS

Secretary, Committee on Accident Prevention and Insurance
Portland Cement Association, Chicago, Ill.

ABSENCE FROM WORK for any cause is expensive to both the employer and the worker. Neither can afford the luxury. Whatever the causes may be, practical means for reducing absenteeism would be welcome in any industry.

There seem to be no grounds for the suspicion that absence from work is more prevalent in cement plants than in other heavy industries similarly situated, but we share with others the conviction that no absenteeism is desirable and the belief that much absenteeism can be prevented.

Last year when it was discovered that more time was being lost and interruptions to business were more numerous from non-accident than from accident causes, the Committee on Accident Prevention and Insurance of the Portland Cement Association decided to study the nature and extent of absenteeism from work in preparation for a program aimed at the reduction of lost time.

At the outset no effort was made to go into absences due to personal desires and similar reasons as it seemed more logical to identify and attack such causes as illness and accidents outside the plants, both of which are not desired by those who suffer them and both of which might be expected to be preventable to a large extent. On the other hand, immediate efforts to reduce absence due to employe choice might be interpreted somewhere as an infringement on personal liberty, and even if successful, would reach only one of the minor causes. So the study of such absenteeism has been left for a later date.

The study to be described has to do only with absences due to illness and accidental causes. At our invitation, 31 cement mills, well distributed through the United States and Canada east of the Rockies, participated in the study and provided the committee with quite complete statistical data covering their experience in 1935. This group represents large variations as to size of plant force and other factors and seems to constitute a fair cross-section of the industry in the territory covered. The results are so gratifying that more complete studies are to follow.

Data collected were divided as follows:

(*a*) *Illness absences,* due to
- —respiratory diseases
- —abdominal and digestive disorders
- —miscellaneous illnesses, including rheumatism, arthritis, and all others.

(*b*) *Accident absences,* due to
- —non occupational mishaps
- —occupational mishaps

In the 30 cement plants which provided complete reports in the study, 1,176 persons lost time on account of illness, probably around 20% of the total number employed. In these plants, 7,536 days were lost because of illness. The corresponding total for 31 plants is 7,712 days, equivalent to 25.7 working years of 300 days each. The average loss of time for each person who was ill was 6.41 days.

The frequency rate for all illness reported was 0.96 of an absence per 1000 man-days and the severity rate, 6.20 days per 1000 man-days. There were 21 deaths due to illness.

Respiratory Diseases

Respiratory diseases constituted the most important cause of illness absences, providing 55.70% of all such cases and 37.72% of the time lost through all illnesses. In both of the other two classifications of illness—abdominal and miscellaneous—the proportion of absences was smaller than that of the time lost.

Colds ranked first in the number of respiratory absences. Head colds accounted for 41.38% of absences due to diseases of this general classification and chest colds to 18.78%. Influenza caused the greatest loss of time, head colds next, and chest colds third.

There was only one case of tuberculosis which caused loss of time, this one person losing 18 days. Bronchitis with an average loss of 10 days per illness and pleurisy with an average loss of 7.83 days per illness gave evidence of being quite severe, but the number of cases of each is comparatively insignificant, only 4 cases of bronchitis and 9 cases of pleurisy being recorded. Pneumonia caused the greatest loss of time per absentee. Each case absent because of pneumonia averaged 19.22 days' lost time.

Respiratory trouble resulted in 10 deaths among workers in the 30 plants under consideration. Eight of the deaths were due to pneumonia, one to tuberculosis, and one to influenza. The average age at which death due to pneumonia occurred was 46.32 years, the highest age being 66 years and the lowest 33 years. The person who died of tuberculosis was 47 years old and the one who died of influenza was 26 years old. In this last case meningitis was a complication.

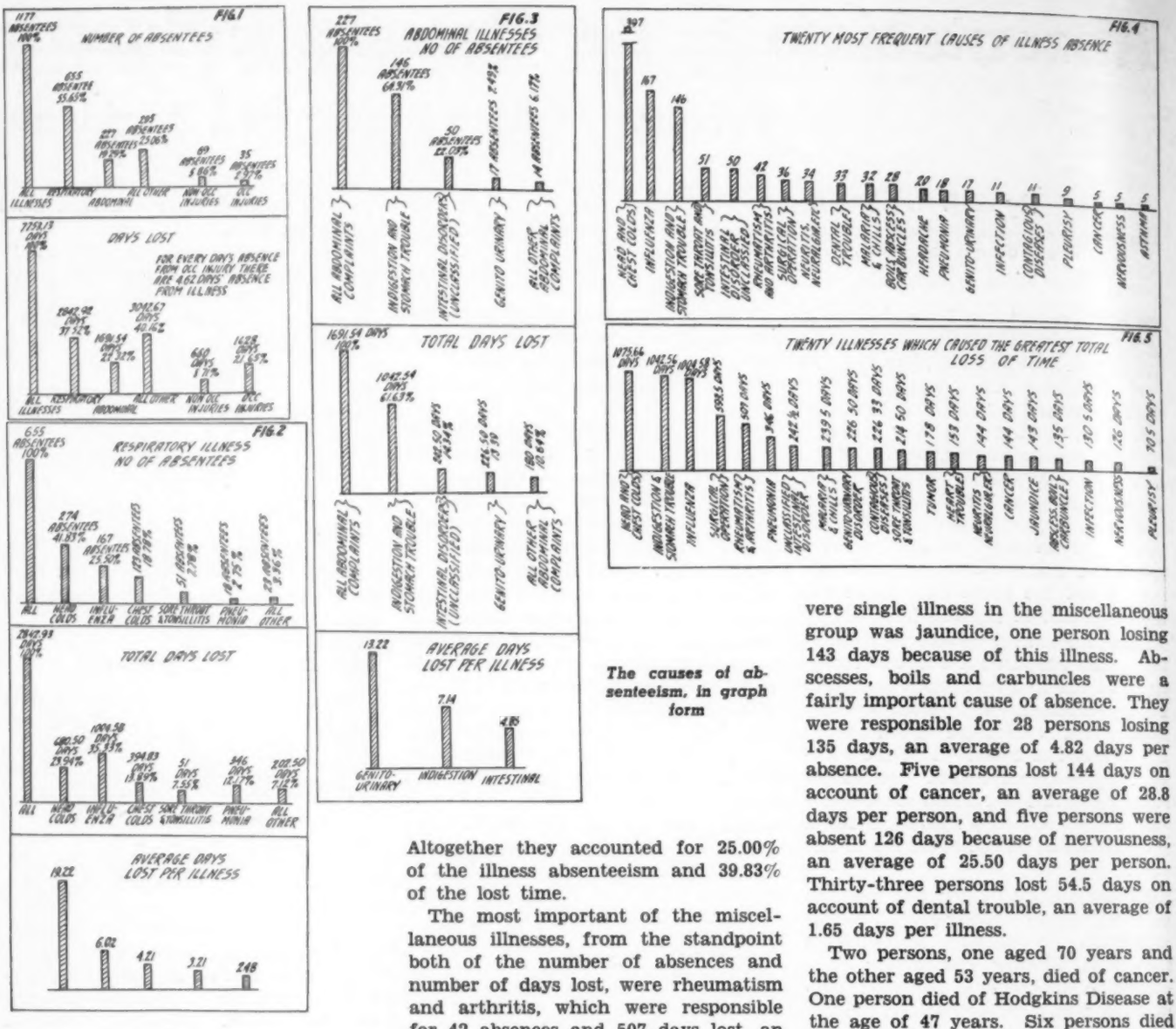
The frequency rate for respiratory illnesses is 0.53 of an absence per 1,000 man-days and the severity rate is 2.32 days lost per 1,000 man-days.

Abdominal and Digestive

These types of illness caused considerably less loss of time than did respiratory illnesses. They were responsible for only 227 absences, or 19.30% of the total illness absenteeism. Relatively, the severity of abdominal illnesses was somewhat greater. They were responsible for 22.45% of the total lost time. The three most significant causes of absence in this group were: (1) indigestion and stomach trouble, which ranked first with 64.31% of the the absence, and (3) genito-urinary disabsence due to abdominal illnesses, (2) unclassified intestinal disorders, which were responsible for 22.03% of turbances, which caused 7.49% of the absence.

Other illness in this classification were appendicitis, gall bladder infection, colitis, diabetes and hemorrhoids. These illnesses were relatively unimportant, however, as only 14 persons, or 6.17% were absent due to these causes. In total days lost, the order of importance of the three most significant causes follows closely in the corresponding order of the number of absentees. Indigestion and stomach trouble caused by far the greatest amount of lost time, with intestinal disorders and genito-urinary disturbances ranking second and third, respectively.

In actual severity, genito-urinary diseases ranked first amongst abdominal disorders, each illness causing an absence on the average of 13.22 days. Indigestion was second with an average absence of 7.14 days per illness, and unclassified intestinal disorders, third



The causes of absenteeism, in graph form

with an average of 4.85 days per illness.

The less important illnesses in this group, from the standpoint of the number of absences, were for the most part relatively severe. One case of diabetes caused 59 days' lost time. One case of colitis caused 13 days' lost time and four cases of appendicitis caused a total of 75 days' lost time.

Only one death was attributed to abdominal disturbance. This man, 36 years old, died as a result of kidney infection.

The frequency rate for abdominal and digestive tract illnesses is 0.19 of an absence per 1,000 man-days, and the severity rate is 1.37 days lost per 1,000 man-days.

Miscellaneous

There was a large variety of miscellaneous illnesses, no one of which is necessarily comparable with the others, as they are entirely different in nature. Altogether they accounted for 25.00% of the illness absenteeism and 39.83% of the lost time.

The most important of the miscellaneous illnesses, from the standpoint both of the number of absences and number of days lost, were rheumatism and arthritis, which were responsible for 42 absences and 507 days lost, an average of 12.07 days lost per case. Thirty-four surgical operations resulted in 552.50 days' lost time, an average of 16.25 days per case. Muscular and nerve disturbances, such as neuritis, neuralgia, muscle cramps, etc., were responsible for 34 absences and 144 days' lost time, an average of 4.24 days per illness. The incidence of malaria and chills is interesting because of its territorial distribution. There was a total of 32 cases causing total loss of time of 239.50 days, an average of 7.49 days per absence. Due to the fact that one company combined reports for its four plants, the location of three of the 32 cases cannot be determined. Of the other 29 cases, 6 occurred in Georgia, 5 in Alabama, 4 in Texas, 1 in Louisiana and 13 in Missouri. All 13 of the Missouri cases occurred in one plant. Heart trouble caused comparatively few absences. Four people suffering from heart trouble lost 153 days, an average of 38.25 days per person. The most severe single illness in the miscellaneous group was jaundice, one person losing 143 days because of this illness. Abscesses, boils and carbuncles were a fairly important cause of absence. They were responsible for 28 persons losing 135 days, an average of 4.82 days per absence. Five persons lost 144 days on account of cancer, an average of 28.8 days per person, and five persons were absent 126 days because of nervousness, an average of 25.50 days per person. Thirty-three persons lost 54.5 days on account of dental trouble, an average of 1.65 days per illness.

Two persons, one aged 70 years and the other aged 53 years, died of cancer. One person died of Hodgkins Disease at the age of 47 years. Six persons died of heart disease. The average age at time of death from heart disease was 49 years, the oldest being 57 years old and the youngest 36. One person, aged 72 years, died of paralysis.

The frequency rate for miscellaneous illnesses is 0.24 of an absence per 1,000 man-days and the severity rate is 2.44 days lost per 1,000 man-days.

Non-Occupational Injuries

In 30 plants there was a total of 69 absences due to non-occupational injuries. These injuries resulted in a loss of time of 660 days. There were only 5.87 absences on account of non-occupational injuries for every 100 absences due to illness, and 8.76 days were lost to every 100 days lost on account of illness. There were seven deaths due to non-occupational injuries. The frequency rate for non-occupational injuries was 0.06 per 1,000 man-days and the severity rate was 0.55 per 1,000 man-days.

Occupational Injuries

Occupational injuries caused about half as many absences as non-occupational injuries. However, occupational injuries were very much more severe. The 35 occupational injuries caused a total loss of time of 1,678 days, an average of 47.94 days per absence. For every 100 absences due to illness there were 2.98 absences because of occupational injury and for every 100 days lost on account of illness 21.76 days were lost on account of occupational injuries. Occupational injuries resulted in four deaths.

Yearly Wage Loss

The average loss to each person who was ill was $19.86. To each person who was injured outside of the plant the loss was $29.85, and the average wage loss for each person who was injured while at work, was $167.23. These figures, of course, follow closely the severity trend.

Conclusions

Although comparative data are inadequate, it would appear that the incidence of illness in the portland cement industry is about on an average with the illness incidence in general. Comparison of accompanying charts shows forcibly that the most significant illnesses, from the standpoint both of frequency of absences and total amount of time lost, are the less severe types and therefore should be, in most instances, readily preventable. Since such a large proportion of the illnesses are definitely preventable there appears to be considerable room for improvement in the illness absenteeism rate. Systematic health campaigns designed to give employes reliable information on protection against exposure to weather and proper living habits should help materially to reduce the incidence of illness.

Foreign Cement Industry

INTERESTING side lights on the portland cement industry in European countries which are sending more and more of this product to the United States is contained in a report by American vice-consul Mason Gilbert, Brussels, Belgium, in coöperation with Jacques Lagrange (Mineral Trade Notes, U. S. Bureau of Mines, November 20).

"It is reported that negotiations are proceeding between the Belgian cement cartel and the English, Danish, German, and Yugoslav producers to control European production and sales, and, should these negotiations be successful, the new association will seek to reach an agreement with American producers. The Belgian cartel of portland cement manufacturers, created July 1, 1935, is now supervising virtually all of Belgium's cement industry, including slag and iron cement manufactures, as well as limestone quarries and pits.

"In the third quarter of 1936, the Belgian cement industry continued to receive a large volume of orders in the domestic as well as foreign markets. According to information received, the portland cement manufacturers already have contracted for over 200,000 tons for future Government public works. Prices named in the contracts are those that prevailed when the contracts were signed, which means that recent increases will not affect them. An underground station in Brussels will use about 16,000 tons of cement, and the construction of 400 kilometers of highway soon will offer an outlet for the cement industry. Cement sold by the Belgian cartel for military purposes since July 1, 1935, is given at 50,000 tons.

"Since September 1, 1936, prices for the domestic market to dealers have increased by 5 francs per ton in bulk and 7 francs per ton in paper bags. A further increase of 10 francs per ton is contemplated as of April 1, 1937. It should be noted that, in their negotiations with the Government, the cement cartel's representatives insisted upon being permitted to increase their prices by 10 francs per ton, but the Government considered such an increase unjustified. At present the lowest price quoted to dealers for large shipments (per barge of 240 tons) is reported to be 132.50 francs per ton in bulk, against 127.50 francs the preceding quarter.

"Export prices have undergone no significant change. Competition in foreign markets is always very keen. Belgian manufacturers contend that the agreements entered into by American manufacturers of the Tampa (Florida) area have not been observed, which has resulted in German manufacturers driving Belgian producers from that market. Further, the erection of two cement works in Ireland by Danish firms, with a potential capacity of 275,000 tons, is not welcomed by Belgian manufacturers, who in recent years had succeeded in obtaining some 60% of the Irish consumption, (325,000 tons). It is too early to say what repercussion, if any, the recent devaluation of the Dutch currency will have on the Belgian cement exports to that country, which is thus far the most important outlet for Belgium.

"The United States market is the only one in which substantial progress was made. During the third quarter of 1936, cement exports to the United States through the Antwerp district were 53,225 bbl., shipped to New York, Boston, Lake Charles, New Orleans, Jacksonville, Charleston, Portland, and Port Everglades, the c. i. f. quotations ranged between $1.275 and $1.42 per bbl., and the f. o. b. quotation was $0.834. Exports from the Brussels consular district were 223,741 bbl., valued at $193,295, for New York, Jacksonville, Mobile, Boston, Wilmington, Savannah, Charleston, Pensacola, Corpus Christi, and Baltimore; c. i. f. quotations ranged between $1.17 and $1.69 per bbl."

Sales Doubled

CARNEY CO., Mankato, Minn., sales of masonry cement are reported to be 100% above 1935. This company has concentrated on the manufacture of natural cement since 1883. It now has a daily capacity of 3000 bbl. and maintains an up-to-date laboratory to control quality and uniformity of its product, which has a nation-wide distribution.

May Rebuild Plant

LEHIGH PORTLAND CEMENT CO., Allentown, Penn., may rebuild the old Alsen Cement Co. plant at Catskill, N. Y., according to local newspaper reports. This is one of the first portland cement plants built in the United States. It was taken over during the World War by the alien property custodian and later sold to the Lehigh company. It has not been operated for many years.

Sales Staff Changes

PENNSYLVANIA-DIXIE CEMENT CORP., New York City, announced, effective November 16, the following changes in sales organization: Herbert M. Cross, former district sales manager at Philadelphia, Penn., made district sales manager at New York City, in charge of sales in metropolitan and suburban territory, New Jersey and Connecticut; Joseph G. McCabe, Jr., promoted from salesman to be district sales manager at Philadelphia; Ira F. Honaman promoted to be assistant district sales manager at Philadelphia.

User's Manual

MARQUETTE CEMENT MANUFACTURING CO., Chicago, Ill., has recently published "A User's Manual" on high early strength cement, which contains 70 pp. of helpful information on the many special uses of this type of cement.

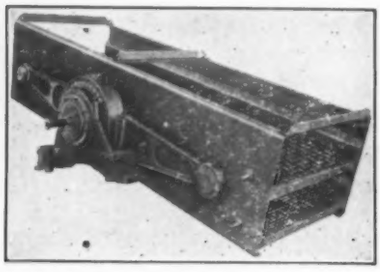
Plant Completed

PENN ALLEN SLAG CO., Bloomsburg, Penn., has placed in operation a new slag crushing and screening plant on property leased from the Bloomsburg Water Co. G. M. Edwards is in charge.

New Machinery and Equipment

Vibrating Screen

Productive Equipment Co., Chicago Ill., has refined and improved its "Selectro" vibrating screen to include use wherever there are corrosive materials to be handled. Improvements include the use of stainless steel throughout and the use of the selective throw which enables an operator to vary the

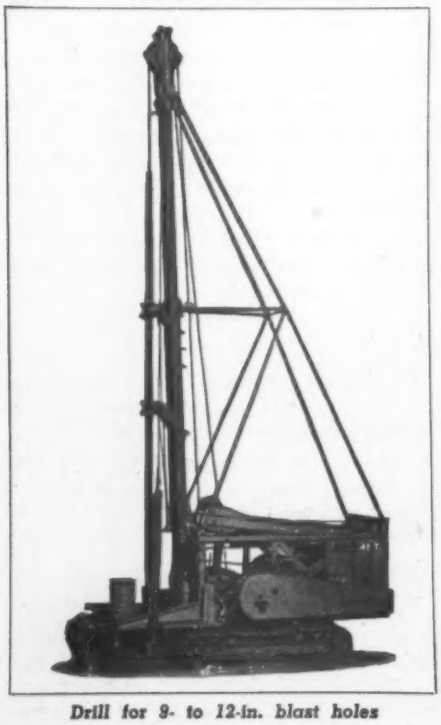


Vibrating screen of stainless steel

stroke of the screen should the material vary or should a different material be screened. Other improvements are the use of oil for all parts instead of grease and the method of changing the tilt even while screen is in operation.

Blast-Hole Drill

Bucyrus-Erie Co., South Milwaukee, Wis., announces its newest and largest Bucyrus-Armstrong drill for large diameter blast holes (9 to 12 in.), known as the 42-T. It handles up to 6000 lb. of cable and tools; has a power-driven tool wrench which sets up and breaks tool joints entirely by power; the 48-ft., telescoping derrick is also raised by power. Other features include rubber shock absorbers, rubber-insulated sheaves, wire line cable, welded all-steel construction, full length crawler mounting. Choice of an 80-hp. Diesel engine or electric motor is offered for power.



Drill for 9- to 12-in. blast holes

Diesel Engine

Ingersoll-Rand Co., New York City, recently announced an improved line of Diesel engines known as type S. It is of the vertical, four-cycle, single-acting, solid-injection type designed to run at medium speeds and built for heavy-duty, continuous service. The fundamental design is similar to that of the Ingersoll-Rand locomotive engine

Vertical, 4-cycle Diesel engine

of which there are more than 140 in operation. Some of these have been in service for over 12 years. Type S engines are made with 3, 4, 5, 6 and 8 cylinders for ratings from 150 to 460 hp.

Puncture-Proof Tires

B. F. Goodrich Co., Akron, Ohio, has been issued a patent covering an inner tube which seals punctures in tires while the car is in motion, known as the "Seal-O-Matic" tube. This tube is made with a layer of plastic self-sealing composition on the inner side so that holes are closed without loss of air when the penetrating object is removed. It is claimed that tires so equipped have been subjected to more than four years of road service on cars and trucks.

Bucket Belt

United States Rubber Products Inc., New York City, announces the "U. S. Bucket Belt," a new addition to its line of elevator belts, designed to care for handling lighter stone, coal, and similar services. It has a specially designed 32-oz. duck body, and high grade cover to meet requirements as an intermediary belt between the heavier duty and lighter weight elevator belts.

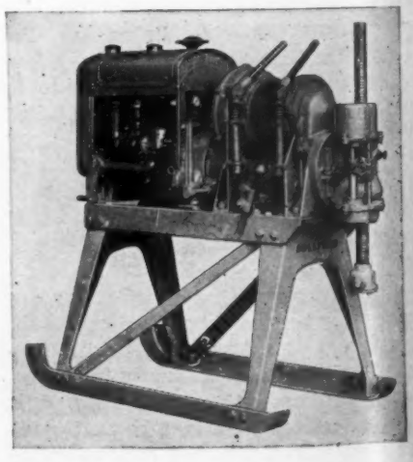
High-speed excavator

One-Yard Excavator

Harnischfeger Corp., Milwaukee, Wis., announces its P&H 455 high speed excavator, Diesel- or gasoline-engine powered, of 1-cu. yd. dipper capacity. It has standard tractor crawlers, made by the Allis-Chalmers Manufacturing Co. Like the earlier ¾-yd. size, the 455 is made light by use of high-tensile steels and electric welding.

Core Drill

Sullivan Machinery Co., Michigan City, Ind., announces the new No. 12 core-drill, smallest size it makes, which is claimed to have a 50% increase in drilling speed over older types. It is 4 ft.-7 in. high and weighs a little over 1000 lb. Four compact parts—hoist, engine, swivelhead and frame—can be dismantled for transportation. Hydraulic or screw feed swivelhead can be set for drilling at any angle. Variable speeds enable working in soft or hard formation. It has gasoline or electric drive.



Small core drill of increased speed

Respirator

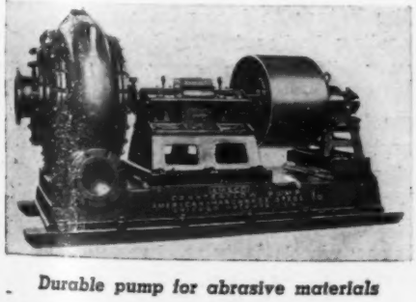
H. S. COVER, South Bend, Ind., has placed on the market an improved "Dupor", plate respirator, which features a greatly enlarged area on its double filter chambers; the filter area for both pads is more than 24 sq. in. The screw cap lid has been eliminated entirely and the filtered air passes between the plate extrusions to the protected opening and into the respirator interior. The marginal edge of plate has

Bulb valve type respirator

an inwardly curved edge to anchor filter pads and prevent leakage. It is called Bulb Valve type No. 24, and has been approved by U. S. Bureau of Mines No. BM 2111, for use in type "A" or pneumoconiosis producing dusts.

Pump

AMERICAN MANGANESE SREEL CO., Chicago Heights, Ill., offers what it terms "a major design improvement" in abrasive material handling pumps, the "Counterflow" pump, made of "the toughest steel known." Features claimed are a wide funnel-mouth impeller; threading of the impeller bore; elimination of internal leakage; reduced internal wear, accomplished by providing clear water under pressure between the impeller shrouds and the shell side plates; with counterflow action, replacing sand-laden water which is a cutting compound with clear water which is a lubricant. The new pump is available in all sizes, and it is said practically all pumps now in service may be converted to the new type at nominal cost.



Durable pump for abrasive materials

Loader handles 5 cu. yd. per minute

Truck Loader

GEORGE TAISS MANUFACTURING CO., New York City, "points with pride" to a new piece of equipment in operation at the Great Notch, N. J., quarry of the Consolidated Stone Co.—a Model 135 loader. At this plant surplus rock is stockpiled and recovered by portable bucket loaders for truck deliveries. Loaders of 2 and 3 cu. yd. per minute capacity have long been used. The new loader has a rated capacity of 5 cu. yd. per minute. Working with ¾-in. crushed stone it is said to have established a record of 8.4 cu. yd. per minute.

Blasting Explosive

SOUTHERN DYNITE CORP., Johnson City, Tenn., has entered the commercial explosives field in the East, South and Southwest with "Dynite". The nature of the explosive is not divulged, but some of the virtues claimed for it are: water resistant for 24 hours; non-headache and non-freezing; bullet-proof; will detonate with a No. 6 blasting cap; low fire resistant; made in all strengths and sizes.

Plastic and Liquid Rubber

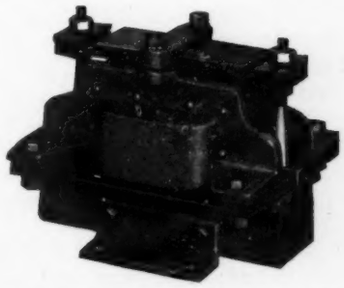
MANSON GLOVER, Stoughton, Mass., has issued an interesting and valuable "Engineering Manual" on "Malacca" and "Colvule" plastic and liquid rubbers. These are rubber, or rubber derivatives, suspended in water, naphtha or other solvent, compounded to meet certain definite needs in industry. They are self-curing on evaporation of the solvent at ordinary temperatures. They are claimed to have then all the properties of rubber.

These products have a wide variety of uses in the rock products industry including repair and maintenance of conveyor belts, protecting chutes, cyclones, pump impellers and housings and similar equipment against abrasion, etc. Their use has limitations, which are described in the manual referred to. This manual gives detailed instructions for using the products and is well worth a place in any rock products' plant reference library.

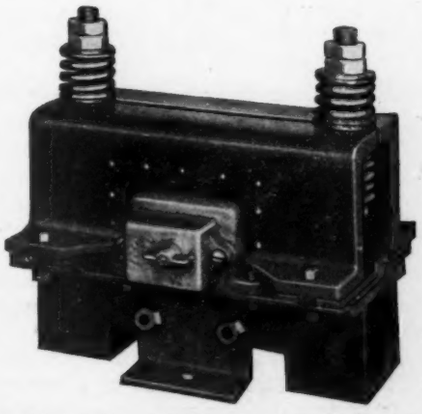
Electric Vibrators

SYNTRON CO., Pittsburgh, Penn., markets a line of electric vibrators especially designed to keep materials flowing in hoppers, chutes, weighing containers, etc. They are also used in concrete products manufacture for vibrating molds and forms. The vibrator is designed to be attached to the sides of hoppers or chutes to prevent pulverized or crushed materials from arching and to maintain a steady flow. The special, patented feature is a separate controller containing a thermionic valve that changes alternating current to pulsating waves, with a time interval between them. These are claimed to give the vibrators a long stroke, with amplitude and power not possible with a straight a.c. current. They have 3600 vibrations per minute. They are made in various sizes weighing 9 lb. to 128 lb. each.

Small vibrator with noise-muffling hood



Vibrator for hoppers holding up to 1500 lb.



Heavy duty vibrator for use with heavy tonnages

Digest of Foreign Literature

By F. O. Anderegg,
Consulting Specialist in Building Materials, Newark, Ohio

Freyssinet Method of Pre-stressing Concrete—An analysis of the ideas of Freyssinet concerning the pre-stressing of concrete beams has been prepared by Prof. K. W. Mautner, formerly of the Aachen Technical School. The advantages of this system [cf. ROCK PRODUCTS (1933), No. 3, p. 44, March 25; (1936) No. 9, p. 72, September] include: (1) Elimination of all tensile stresses and of all danger of crack formation. (2) It is possible to treat the whole cross section as the compression section so that the member under bending loads acts with its complete cross section and moment of inertia and can be handled as a homogeneous body. (3) The result is a great increase in the load that may be carried by a given member or a very considerable diminution in size of beam for carrying a given load. (4) Under variable loading and under repeated variation in loading no danger of crack formation exists, and the change in stress on the steel is a minimum.

Previous efforts at pre-stressing had only begun to realize the possibilities and it remained for Freyssinet to develop these ideas to the logical conclusions. He applies tensile loads to the steel of the order of 60,000 to 100,000 lb. per sq. in. by using steels with elastic limits of 120,000 to 170,000 lb. per sq. in. He applies the loads to all steel units quite independently of the form and in a simple but very reliable and consistent manner. To secure these results it is essential to make concrete of the highest possible quality by choice of ingredients, vibration and heating, whereby the forms can be released in a very short time. As a result it is possible to assume with perfect assurance, for calculations of load carrying capacities, compressive strengths as high as one-third of the 28-day strengths; that is, one may use 2000 lb. per sq. in. compressive strength and still allow plenty for factor of safety.

Applications include a rebuilding of a dock at Le Havre, numerous installations of thin-walled poles for power transmission, and more recently the production of heavily loaded beams and of tubing of very large diameter carrying very high internal pressures. The ratio of load-carrying capacity to dead load is very greatly increased over orthodox reinforced concrete.

An I-beam was made up in Germany according to these methods of a length of 20 meters, for the purpose of testing a proposed 60-meter tie beam for a hall. The steel was pre-stressed to 78,000 lb. per sq. in. and when loaded with 1340 lb. per ft. the whole cross section was in compression, the upper fiber carrying 2046 lb. per sq. in. and the lower 270. On increasing the load to 2350 lb. per ft. the compression in the upper fiber increased to about 2300 lb. per sq. in., while in the bottom fiber the stress changed into about 575 tensile. The pre-stressing placed a compression load on the bottom fiber of 2920 lb. per sq. in. The moment of inertia is so great that the deflection was quite small, being only 1 in 750 at the design loading. This would correspond to the deflection of a steel member (Eisenkonstruktion-strager) of the same cross section loaded only to 7000 lb. per sq. in.

A tube of 17 in. inside diameter with the steel pre-stressed was subjected to an internal pressure of 1320 lb. per sq. in. with no perceptible loss of water, while a similar tube, the only difference being in the lack of pre-stressing, allowed leakage at below 90 lb. per sq. in. Pipes of 31 in. diameter, with 1-in. walls are being commercially manufactured, which withstand 235 lb. per sq. in. perfectly. These pipes are removed from the forms within a few hours, the concrete at a very early age receiving a pre-stress of 2000 lb. per sq. in. If such pipe are tested till leakage takes place, on release of pressure the tubes return to their original tight condition. This is a fact of great importance on considering the possibility of water blows of great intensity. *Beton und Eisen* (1936) 35, No. 19, p. 320.

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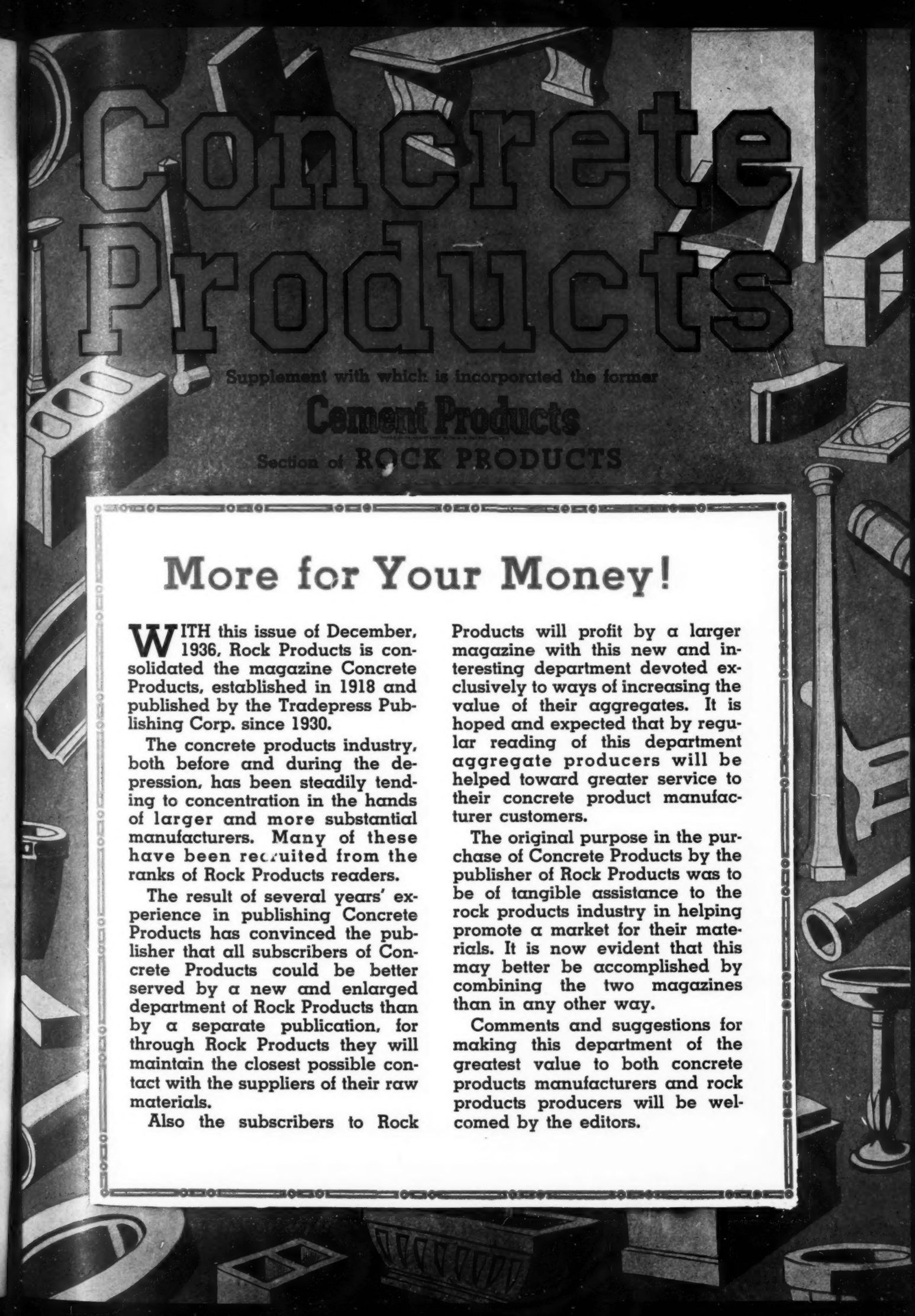
Ring Formation in Rotary Kilns—A Japanese, T. Yoshii, has made a careful study of ring formation in cement kilns. In addition to mud rings in the wet process and clinker rings occurring in the hottest zone, occasionally other rings form between the dewatering and clinkering zones. While the operator usually is able readily by manipulating his controls to remove mud and clinker rings, those formed in the middle are harder to handle and may interfere often quite seriously with proper operation of the kiln. Therefore, considerable attention has been given to the latter type. Factors contributing to ring formation include: the coal and its ashes, the design of the kiln, refractories in the lining, control of the kiln operation, and the raw mix. When the ash composition varies appreciably, difficulty is often experienced with rings, while the content of iron and gypsum in the ash is often very important. Yoshii tried to determine the effect of the fineness of the coal, but failed to demonstrate any effect resulting from such variations as he was able to secure. As to kiln design, the smaller the diameter, the greater is apt to be the trouble, so that it may be desirable to enlarge the diameter where rings tend to form. However, care should be taken that the change in slope does not occur too suddenly, because of the too rapid flow of part of the raw mix before it has been properly treated with resultant baking onto the wall starting ring formation. Such a change would also affect the gas flow rate, reducing it and permitting more cooling.

A kiln line of fireclay units is apt to give trouble by fusing with some of the lime of the raw mix and rough spots tend to aid rings to start. High alumina refractories have given much better service as to ringing. Care must be taken to control the draft and the air blast in order to be sure and remove the alkalies on the one hand and to avoid overheating on the other. However, by causing the temperature of the ring to change, the operator can often break the ring off. It is a question of the modulus of elasticity and tensile strength, and well sintered rings are much easier to detach than when composed of softer materials. The chemical composition is of considerable importance in preventing ring formation and Yoshii has found in one particular kiln which has given him much trouble that by keeping the silica relatively high and the lime relatively low he has been able to prevent this trouble. Of several methods proposed for ring removal including: chains hung in the back end would only break up mud rings; breaking up the intermediate ring with a loose weight would be damaging to the lining; enlarging the kiln diameter is not justified by the results; heavy blows on the shell would doubtless severely damage the refractories; an electrically driven saw would probably work well if a suitable material could be found for the blades; the use of guns the author has not always found to be successful; moving the flame about, while helpful in the sintering zone, is not effective farther back; chilling of the ring with a blast of water or air harms the lining; to incorporate one or more cooling bodies in the lining would be very difficult to carry out; to run through again the pea sized clinker would be uneconomical; finally the best and simplest method is to break up the rings with lances having water cooled handles. The author lets the water run through the shaft and out at the point to secure relatively good results. *Zement* (1936) 25, No. 42, p. 727.



More for Your Money!

WITH this issue of December, 1936, Rock Products is consolidated the magazine Concrete Products, established in 1918 and published by the Tradepress Publishing Corp. since 1930.

The concrete products industry, both before and during the depression, has been steadily tending to concentration in the hands of larger and more substantial manufacturers. Many of these have been recruited from the ranks of Rock Products readers.

The result of several years' experience in publishing Concrete Products has convinced the publisher that all subscribers of Concrete Products could be better served by a new and enlarged department of Rock Products than by a separate publication, for through Rock Products they will maintain the closest possible contact with the suppliers of their raw materials.

Also the subscribers to Rock Products will profit by a larger magazine with this new and interesting department devoted exclusively to ways of increasing the value of their aggregates. It is hoped and expected that by regular reading of this department aggregate producers will be helped toward greater service to their concrete product manufacturer customers.

The original purpose in the purchase of Concrete Products by the publisher of Rock Products was to be of tangible assistance to the rock products industry in helping promote a market for their materials. It is now evident that this may better be accomplished by combining the two magazines than in any other way.

Comments and suggestions for making this department of the greatest value to both concrete products manufacturers and rock products producers will be welcomed by the editors.

VOLUME XLV
No. 6

Concrete Products

DECEMBER, 1936

Published by Tradepress Publishing Corporation

MERCHANDISING CONCRETE PRODUCTS IN TODAY'S BUILDING MARKET

By Harold O. Hayes

INCREASING the use of concrete products in today's building market calls for merchandising of the highest order.

In a number of ways this struggle to increase the use of concrete products resembles the biblical fight between David and Goliath, with the concrete masonry manufacturers playing the role of David and a few but far bigger manufacturers playing the part of Goliath.

In general, the concrete products manfacturer is a local man of limited resources. The local nature of his business doesn't justify a large and imposing plant. His limited market makes it uneconomical to advertise nationally. His advertising budget is not enough to justify the studied consideration of the leading merchandising counsel of the country. And, with few exceptions, his product is thought of as essentially an excellent foundation material. These are the physical characteristics of "David."

"Goliath", on the other hand, has enormous resources. He has a large plant. He sells practically everything necessary for the structure. He advertises widely. And he employs the cream of the country's merchandising talent. He has a highly trained and capable sales staff and dealer organization. And every product bearing his name receives favorable consideration.

This is the competition which every concrete products manufacturer must recognize—and master. That it can be done has been ably demonstrated. This should inspire every plant owner to study his merchandising methods and make every effort to improve them.

What Is Merchandising?

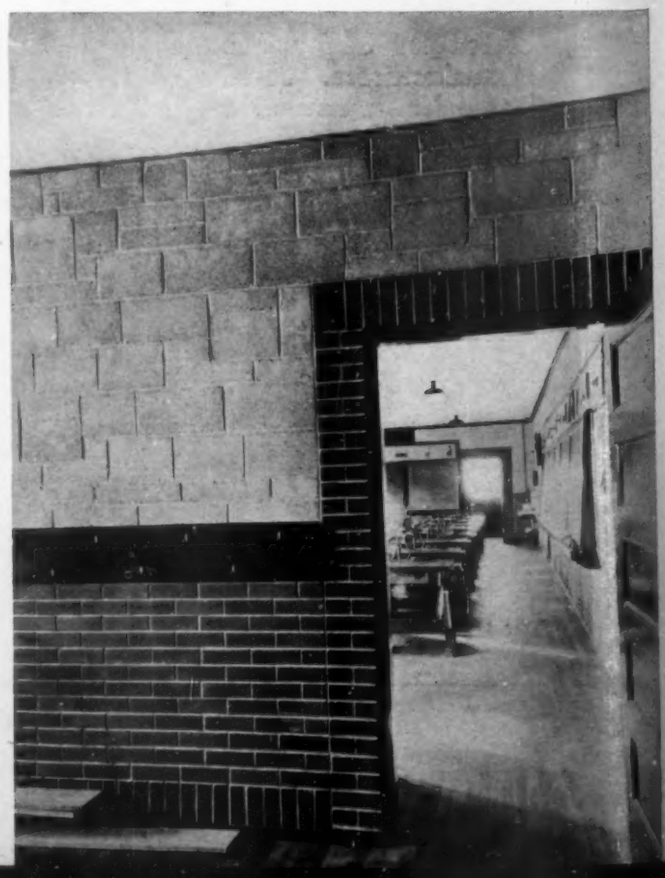
Now let's get a clear picture of what merchandising is. From current use we may consider it the combination of those sales tools, or elements, which influence a sale. These elements may be grouped in four classes: direct selling; sales promotion; advertising and publicity.

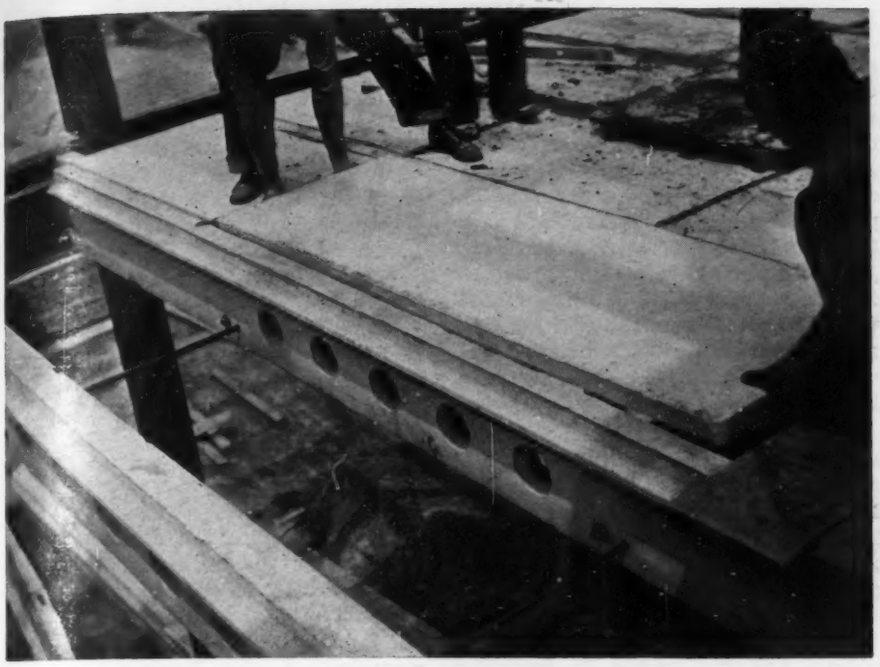
It is the efficient and economical use of these elements, combined in their proper relationship, that extends volume of sales at a profit.

Before considering these four elements it is important to understand that

EXTERIOR—This attractive business block stands as a constant advertisement for its manufacturer

INTERIOR—Concrete ashlar in a school partition gives acoustical effects at no extra charge





The precast floor-slab field can become as stable a market as foundation walls, for concrete products manufacturers

no merchandising program can be eminently and permanently successful unless it is based on a product of sound value. So the first step in any sales building program is to make a thorough study of the product.

Does it meet the standards of the American Society for Testing Materials for quality? This should be the minimum quality of every manufacturer. Can it be improved to widen its appeal and acceptance? Perhaps a thinner web could be adopted. Light-weight aggregate used. A modern curing method. Surface texture might be improved. Is it a product that meets the approval of the mechanics that handle it? Graduation of aggregates might be improved. Better edges might be provided. Greater uniformity might win new friends. Is present equipment capable of producing products of necessary quality?

These are questions which should be asked. They s h o u l d be considered frankly. And, where a positive answer cannot be given, steps should be taken to correct existing weaknesses in the product.

After necessary changes have been made to assure products of satisfactory quality that win friends when they are used, a further study should be made to determine what products might profitably be added, or discontinued.

The Markets

In studying this problem the manufacturer must look at his market and determine his best field for development. These should be studied individually. The relative importance of each should be carefully estimated and the possibility of expanding sales in each should be considered.

Before reaching conclusions based solely on personal experience, it might be worth while to learn from manufacturers in other localities just what their experience has been in the several markets under consideration.

Questions to consider in this study include the following: Is the foundation market large enough to keep my plant operating at satisfactory capacity? Can this market be expanded with reasonable effort, or am I getting all of the business that can be developed at reasonable cost? Which is the better "above ground" market, commercial and industrial construction or residential?

If it is commercial and industrial, will the acoustical and insulating properties of light-weight aggregate justify making them for this market? And what about the partition tile market? If it is residential, shall I concentrate on a back-up unit? Ashlar construction? Concrete brick? Or a unit to simulate clap board exteriors? Or shall I be equipped to furnish all of these?

Still another possibility that demands consideration is whether an intermediate step might not better be undertaken. Since the greatest fire hazard is in the basement, will a fireproof floor of precast joists offer greater immediate opportunity than promoting walls? Where is competition keenest? In which field will my present plant and organization make greatest progress? Or—are conditions right to feature the "fireproof house" and go after all of these fields?

Many things must be taken into consideration in reaching a sound conclusion. Is there a good mason who will coöperate in a drive to sell ashlar construction? What other coöperation can be obtained? What restrictions does the building code set up? How much education will be required for each product? Is there some "Key" that will block or open the market? What steps must I take to win each market? What additional investment will be required? What merchandising will be necessary? These are among the questions which must be answered.

Now let's consider briefly the several markets in the building field before starting our study of merchandising to determine how we may improve its application to concrete products.

Basement Walls

First, the foundation. While there is some talk of eliminating basements in future houses, there is a marked increase in the number of basement recreation rooms. If this is encouraged, it should assure the continuance of past design practice. Encouragement may be given by making sure that basements built of your concrete masonry units will result in a dry basement without

Wall of straight masonry, stuccoed outside, furred and plastered inside, gives low-cost fire-proof walls

An ashlar pattern being placed with concrete masonry back-up. The back-up field can be made into a volume market

cracks, and with a clean neat surface that will look well. This requires an adequate footing and a good, uniform unit, properly laid. Every manufacturer is justified in insisting on this from the builder. Such insistence is essential to safeguard the market for the future.

Commercial Buildings

The fireproof qualities of concrete masonry have strong appeal to commercial and industrial users. Where prevailing standards for such buildings are low, a standard unit of hard aggregate will probably be best suited and most competitive. In a better market an insulating unit of light-weight aggregate may be better suited to the demand.

Such units offer the added property of sound absorption—a feature for which many builders gladly pay large sums. Here is an opportunity to capitalize on the fact that concrete masonry is the one structural acoustical material. As a result it offers decided economies where this is a factor.

The market for partition tile is essentially in metropolitan areas and it is only where there is a reasonable volume of such business that they offer worthwhile possibilities. If there is a population of 150,000 within your economic shipping area this product justifies investigation. Here, again, acoustical properties should be kept in mind while surveying the market.

Residential Buildings

Development of an "above ground" market for concrete masonry in residences should double the sales possibilities for units in the residential field. People demand insulation in their homes today. And this should be realized in considering the type of product required. There is a growing appreciation of the fire-safe house and of the serious threat of termites. This trend should continue. The only practical and economic solution is the concrete house. Naturally, outside walls of concrete above ground are an essential factor in this.

Each manufacturer must determine whether the most economical way for him to capture this market is by promoting something new, such as concrete ashlar, or if a type of unit should be pushed which conforms to a firmly established preference in style of architectural treatment. Or it may be that the largest and most profitable field is offered by switching a masonry market to the use of concrete back-up. This may be particularly true in metropolitan areas where there are apartments and a fair number of the more expensive houses to be built.

One of the most interesting fields is the concrete floor of precast joists. Costing owners only a little more than wood joist construction, its superior qualities have a strong sales appeal. And, once this superiority is demonstrated, it should assure the products plant as stable a market as the foundation has been. Precast floor slabs and joists are meeting with as much success in some markets as joists in many. And where manufacturers can add the floor area of a house to his foundation wall sales he has assured a sharp increase in volume.

Naturally, most desirable from the manufacturer's viewpoint, is the sale of both wall and floors. And a number have made excellent progress in this. It is a worthy objective. Whether to reach this goal a step at a time, or to go after it in one jump is each manufacturer's problem. The volume of business that is thus opened is an attractive plum. And the public is becoming educated to the desirability of such construction. However, Mr. Manufacturer, it is up to you to decide just what your markets are and how you can most economically and profitably expand them. When you have done that you will be ready to start on merchandising.

(To be continued)

Ready-Mixed Concrete Producers' Convention

National Ready Mixed Concrete Association, Washington, D. C., will hold its seventh annual convention at the Hotel Peabody, Memphis, Tenn., December 11 and 12. An interesting and instructive program has been developed and there will be an exhibit of new machinery and equipment.

Forum on Prospects

The program includes a forum on business conditions in which information will be developed in answer to some of these questions:

(1) What was the volume of ready mixed concrete business in your area in 1936 as compared with 1935?

(2) What relation did volume of demand bear to capacity in your area during 1936?

(3) How did the price level in 1936 compare with the price level in 1935?

(4) What types of projects furnished the principal markets for ready mixed concrete in your area in 1936?

(5) What is the prospect for ready mixed concrete business in your area in 1937? Will it represent an increase or a decrease compared with 1936? What is the outlook as to the price structure?

(6) To what extent has our industry in your area suffered from plants owned and operated by contractors for specific projects?

(7) To what extent have established ready mixed concrete plants suffered from competition with companies who operate a relatively small amount of ready mixed concrete equipment as an adjunct to another and principal line of business?

(8) Under what type of specification is ready mixed concrete mainly sold in your area; that is, arbitrary proportions such as 1-2-4, guaranteed strengths, etc.?

Concrete Industries Exposition

ONE of the greatest exhibits of concrete equipment, accessories and supplies that has ever been shown in conjunction with concrete men's conventions will be held in Chicago, Ill., on January 18, 19 and 20 during the meetings of the National Concrete Masonry Association, National Conference of Concrete Contractors, The Cast Stone Institute, The American Concrete Pipe Association, and the National Cinder Concrete Products Association.

In addition to concrete mixers, block manufacturing machinery, special form systems, form clamps and many other interesting displays, there will be an exhibit of equipment for pumping concrete on small jobs.

Members of the Exhibitors Advisory Board of the Concrete Industries Exposition, which is sponsoring the show, include prominent men from every branch of the cement industry.

Eugene F. Olsen of the Stearns Manufacturing Co., is chairman of the board. Assisting him on the board are: Jesse H. Besser, Besser Manufacturing Co.; Louis Brookman, Jr., Concrete Publishing Corp.; J. H. Chubb, Pennsylvania-Dixie Cement Corp.; D. S. Colburn, Marquette Cement Manufacturing Co.; B. F. Devine, Chain Belt Co.; Lion Gardiner, The Jaeger Machine Co.; Robert Harris, Blaw Knox Co.; A. E. Hjerpe, Consolidated Cement Corp.; D. S. MacBride, International Cement Corp.; D. H. MacFarland, Medusa Portland Cement Co.; Roy N. McCandless, Cinder Block, Inc.; Frank Muenzer, Multiplex Concrete Machinery Co.; Thomas W. Noble, Thos. W. Noble Co.; H. H. Potts, Pottsco Corp.; B. H. Rader, Lehigh Portland Cement Co.; T. A. Rehnquist, T. A. Rehnquist Concrete Floor Co.; Dan F. Servey, Haydite Corp.; J. L. Shiely, J. L. Shiely Co.; Blaine S. Smith, Universal Atlas Cement Co.; H. F. Thomson, General Material Co.; Stanton Walker, National Ready Mixed Concrete Assn.; and Benjamin Wilk, Standard Building Products Co.

Properties of Cinder Aggregates

THE DEPARTMENT of Scientific and Industrial Research (of Great Britain) has just issued a new and revised edition of a bulletin published some years ago on the properties of breeze and clinker aggregates and methods for testing their soundness (Building Research Bulletin No. 5, H. M. Stationery Office, 6d. net). The materials dealt with are used in a number of ways in building, but the present publication deals mainly with their use as aggregates for poured concrete, precast blocks or slabs and pressed blocks. The term "clinker" is taken as covering well-burnt furnace residues, which have been fused into lumps, while the term "breeze" is taken to cover any type of furnace residue varying from disintegrated clinker to fine poorly sintered ashes containing a large proportion of combustible matter.

Examples of failures of concretes made from breeze and clinker, it is stated, are not uncommon. In the case of external walls or poured concrete, covered usually with a rendering, general cracking may occur. These cracks develop and become visible in the set concrete in a period which may vary from one to many months after pouring. In the case of blocks, slabs or pressed bricks, similar cracking may occur during the maturing period, but in some cases, visible cracks may only become apparent at a later date.

The constituents likely to cause trouble in breeze and clinker have been found to be certain coals present in an unburnt or very slightly burnt condition. These coals are of certain definite types and cause failure owing to the swelling movements they undergo in the concrete. It is shown that the effect of any particular coal on a concrete can be predicted from its physical properties. The dangerous coals, for example, have the power of removing the color from a solution in water of the dyestuff methylene blue to a greater extent that the safe coals. Again, the coals which are not dangerous take up more moisture when exposed to moist air than the troublesome coals.

It has been general in the past, the bulletin states, to attribute the failure of breeze or clinker concretes to the presence of certain sulphur compounds. It was supposed that oxidation of these compounds occurred and was accompanied by a volume change which cracked the concrete. While it is true that failures can be so produced, it is clear that, in practice, a failure is rarely due to such a cause and that the presence of unburnt coals likely to lead to trouble is the cause of the failure. It may be noted, the bulletin continues, that while exposure to weather will in no way reduce the unsoundness of a breeze or clinker concrete if due to the presence of unburnt coal, it will appreciably reduce any unsoundness due to sulphur compounds. In the case of pressed blocks of breeze or clinker made with lime or cement, a process of autoclaving or other steam treatment tends completely to eliminate any possible dangers due to sulphur compounds. It is without effect in reducing unsoundness due to dangerous coals.

Dealing with the influence of water content on breeze and clinker concrete, it is stated that the setting of such a concrete may be much retarded if a large proportion of fine material is present and a large proportion of mixing water is required. Satisfactory setting and hardening ultimately occur if the aggregate is sound.

The bulletin concludes with a detailed description of simple methods for testing the soundness of breeze and clinker aggregates, the use of which should minimize the risk of failures. Since the tests require practically no laboratory apparatus, they should prove of utility under field conditions.

The first of these—the "pat" test—is based on the expansion occurring during the first few days of setting of a concrete containing dangerous coals. A mixture of fine white plaster of paris and a normal portland cement is used. This mixed with a sample of the breeze to be tested sets rapidly and any expansion taking place causes visible cracks. The test properly carried out may be relied upon, it is stated, to detect the great majority of unsuitable aggregates. The other test suggested depends on the removal of the color of methylene blue dye. A sample of the breeze is placed in a glass tube containing 25 cc. of a solution of the dye and is shaken at intervals of half an hour for six hours while a similar sample is placed in a vessel containing 20 cc. of the dye solution diluted to 1 litre with distilled water. When left over night the color of the solution shaken with the breeze should be deeper than that of the diluted solution. If it is not and is equal to or lighter than that of the second solution the breeze is dangerous and unfit for use. This test detects only certain and not all dangerous breezes.

Makes Concrete Water Main

AMERICAN CONCRETE AND STEEL PIPE Co., Tacoma, Wash., has leased an entire city block at Howard and Cross streets, Salem, Ore., to manufacture concrete pipe for the Stayton Island-Salem gravity water line. F. F. Jenkins is in charge.

Name Changed

CHASE BUILDING PRODUCTS, INC., Fort Worth, Texas, is the new name of the former Fort Worth Concrete Tile Co., Inc. The name was changed that it might be more inclusive of the variety of products made, which include prepared stuccos, cement paints, terrazzo strips, floor clips, toilet partitions, form ties, etc.

Concrete Products Annual Convention

DURING the week of January 18, 1937, the largest gathering of concrete products manufacturers in the history of the industry will take place in Chicago, Ill. Six separate organizations will hold concurrent conventions as follows:

(1) National Concrete Masonry Association, Sherman Hotel, January 18, 19 and 20.

(2) National Cinder Concrete Products Association, Sherman Hotel, January 18, 19 and 20.

(3) National Conference of Concrete Contractors, Sherman Hotel, January 18, 19 and 20.

(4) Cast Stone Institute, to hold convention in Chicago during week beginning January 18, hotel and exact dates to be announced.

(5) American Concrete Pipe Association, Edgewater Beach Hotel, January 21 and 22.

(6) Concrete Industries Exposition, Sherman Hotel, January 18, 19 and 20.

One of the principal subjects discussed at the National Concrete Masonry Association meeting will be model homes of concrete and creating a market for houses of concrete by various methods. Other subjects will be the use of high early strength cement in products, high pressure steam curing and the details of manufacture of specially shaped units. The products manufacturers will hold at least one joint session with concrete masonry contractors, under the auspices of the Portland Cement Association.

The National Cinder Concrete Products Association will meet at the same hotel as the N.C.M.A., but in separate sessions. This group has long been a compact unit due to a patent situation which permitted cinder products manufacturers to operate under a license.

Personal Contact Program Doubles Sales for Concrete Products Manufacturer

Currier Bros. Develop Market for Concrete Specialties

THE BEST time to sell home concrete specialties is before the house is built, according to Harry T. Currier, partner in Currier Bros., concrete products manufacturers at Burbank and Glendale, Calif.

After developing one of the largest cast specialties businesses in Southern California at Glendale—in partnership with his brother—Mr. Currier decided to expand into new territory and opened a yard at Burbank. Through an unusual plan of personal contact work built around the idea of advance selling, he more than doubled the yard's business last year.

A full time salesman is employed. He works outside almost entirely, following up new building and other leads. He also works a good deal by making appointments at the yard to show merchandise.

The salesman has a list of building-contractor friends whom he constantly contacts, getting from them the locations of new building jobs. He gets this information far enough in advance so that he can bid for the cesspool job before the foundation is ever laid. In many cases, the cesspool sale is made on the first contact in this way. The salesman checks the soil on the lot and if he finds good sand, he suggests that the builder can save money on sand for his foundation by having the cesspool dug before the foundation job is started and using the sand out of it.

Uniquely Cast Cesspool

This company makes an unusual cast block cesspool. The hole used is 4 ft. in diameter. The tank or pool is made of rows of the cast blocks, one laid on top of the other. Eight of the blocks form one row in the pool. Any desired depth can be created by use of additional rows. Each block is the same length but the sections are cast with different curves so that they fit together to form a perfect circle. Each block has six holes 2 in. in diameter in it—holes arranged in two rows.

The blocks are cast in specially built cast-iron forms. They are simply fitted around the edge of the pool hole. No wiring or other fastening is required.

Septic Tanks

Blocks of the same size and type except for the absence of holes are used for septic tanks. The septic tank tops would be too heavy for convenient handling if made in one piece so they are cast in two sections. The wet concrete is poured into a round form with a strip of wood across the center. The wood strip separates the top into two perfectly fitting halves.

When the blocks are used for septic tanks, they are coated with a thin layer of cement after being assembled into tank form. The top is also covered with cement. The tank design is a simple one. Two of the tanks are used. The one on the left side has an inlet high up on the far side. The right hand tank has an outlet on the same level, located on the far side. The two tanks are connected by an opening at a level below inlet and outlet. Thus, the solids stay in the first tank and the liquid goes on into the second tank and out.

The first sales approach to the builder of a new house is made on a cesspool, because it is a necessary utility item which he is sure to buy. When that sale is made, cast flagstones, incinerators and a variety of decorative yard items such as bird baths and rustic drinking fountains of concrete, benches and artificial wells are suggested. When the contact can be made before the house is built, the chances of selling decorative specialties are unusually good because the builder can often be persuaded to plan his landscaping to provide for them.

New building which isn't learned of through the contractors is observed through the building permit column of the local paper or through the list of permits at the courthouse. All permits are followed up the day they come out.

If the Currier representative doesn't make a sale to the contractor, he follows the progress of the house and as soon as it is sold, contacts the buyer. Of course, these follow-up contacts don't yield cesspool business but they do bring in many decorative item sales.

"We've found that the surest way to get business is to go out after it," says Mr. Currier. "Our growth at this yard has been fast because we have followed that policy. Our return on money invested is much greater from personal contact work than from advertising."

Attractive display of a wide variety of precast specialties at Burbank, Calif., yard of Currier Bros. proves a valuable aid to aggressive salesmanship

Buys Vault Plant

THE SELINSGROVE AIRSEAL VAULT WORKS., Selinsgrove, Penn., recently purchased the vault plant of J. C. Broome, operating under the name of Lewistown Concrete Vault Plant at Lewistown, Penn.

Another Plant

STEPHEN MORAN, Montezuma, Iowa, has purchased the property of the old Minneapolis and St. Louis railway station, and is installing equipment for the manufacture of concrete vaults and other concrete products.

Unique Low Cost Rail Facilities Cut Handling Costs 50% For Coast Pipe Company

By Lucius S. Flint

INSTALLATION of light railroad facilities in the storage yard reduced handling costs more than 50% for the American Concrete Pipe Co. of Los Angeles, Calif. That figure includes virtual elimination of handling breakage as well as actual handling costs.

Like many other manufacturers, this company formerly stored its pipe in continuous rows down the length of the five acre yard. Thus, when a length of pipe had to be gotten out of the center of any of those rows, it was necessary to work a crane in between rows —which in itself was often a very difficult job—and then lift the pipe out with the greatest care. The whole job was a "ticklish" one in which pipe was frequently broken.

Now, all this is done away with. Every piece of pipe in the yard is easily accessible and can be moved quickly on light-weight flat cars pulled or pushed by "dinky" locomotives powered with Ford V-8 motors.

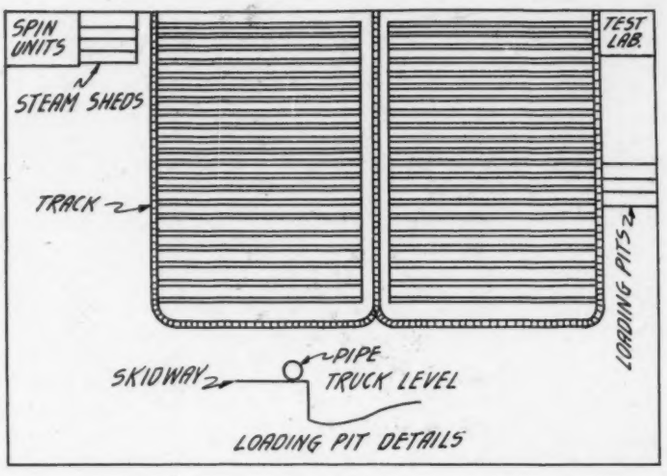
At the left side of the yard on one end are the spinning units—this company uses the centrifugal method. To the right of them are the steam sheds. To the right of the sheds and running parallel to them are concrete rollways. Rows of these rollways extend the length of the yard and all across its width. The pipe is rolled by hand out of the steam sheds, if it goes to the rollways directly opposite. If not, it is placed on flat cars and taken down the line to whatever rollway it is destined for.

Trackage is laid in two large U's, the right side of the left U and the left side of the right one being joint trackage. The left side of the left U runs between the steam sheds and the rollways, at right angles to the rollways. The bottoms of both U's are parallel to the rollways.

At the right-hand corner of the yard, opposite the steam sheds is the testing laboratory. Farther down on the right side of the yard are the loading pits where pipe is transferred from skidways to trucks for delivery.

By dividing the rollways in the middle, the trackage makes access to the pipe stored, doubly easy, much more so than if it was in the form of a single U. Pipe stored on the right sides of the centers of either U is worked to the right track, while everything stored to the left of these centers is worked left.

The truck loading pits are simple in design but highly effective. The skidways, on to which pipe can be placed either from the flat cars or from the rollways, extend on a level up to the vertical edge of a pit the same depth as the height of the truck bed. The truck is backed down into the pit, with the back end up against the vertical edge of the loading pit. Thus, the pipe can be rolled right from the skidway on to the truck. The bottom and right side of the loading pit slope at about the same curve as an eggshell.



Double U rail tracks make pipe in rollways easily accessible

The present plant location was selected partly because the ground is almost entirely level. What few depressions and raises existed were graded out before the present storage arrangement was installed. Thus, it is possible for one man to roll easily even the heaviest pipes.

The tracks are narrow gauge, built of light-weight rails. The flat cars were also built right in the yard. About a dozen cars and two "dinkeys" are used. The locomotives are ordinary "home-made" flat cars powered by the Ford engines. In this way, the investment in handling equipment was kept down to a point well within reach of any ordinarily successful pipe manufacturer.

"Difficulty in handling heavy pipe is too often considered a sort of necessary evil," says Sales Manager R. V. Edwards. "Actually, there is no more need for trouble in handling pipe than in manufacturing or selling it. It's just a case of developing the proper handling facilities to fit the needs of the individual yard. The small cost of our equipment has made it especially practical. Our automobile motor powered 'dinkeys' serve our purpose just as well as would costly steam locomotives."

Concrete Brick Plant

DR. HERBERT L. POPE and EARL M. BIDDLE, Knoxville, Tenn., have established a plant on Cherry St. to make Dunbrik, a patented concrete brick.

New Industry

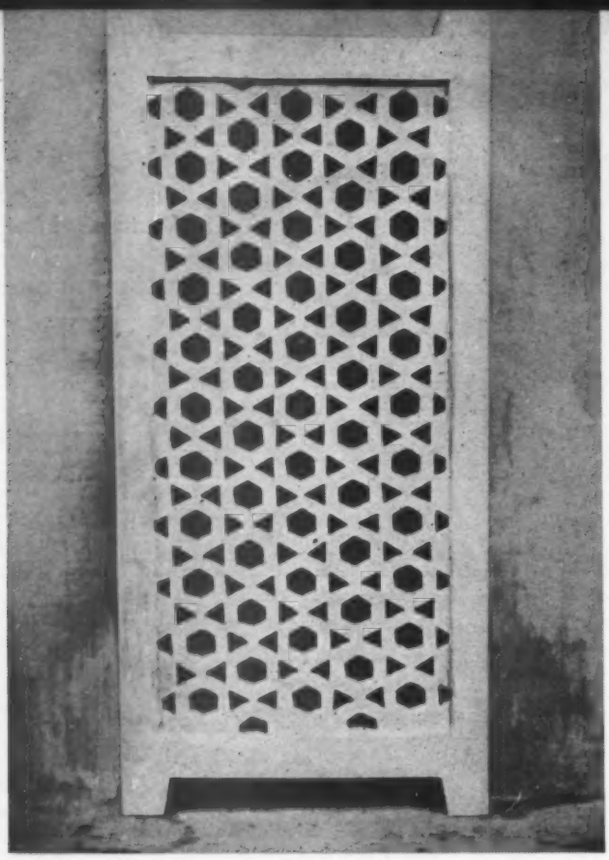
PRECAST CONCRETE CO., Portsmouth, Ohio, has been organized to succeed the Superior Waitex Co. The property of the Kelley Bros. Construction Co., Broadway, has been leased and a plant is being constructed to manufacture a complete line of concrete products, including cinder building blocks, precast concrete joists, floor slabs, cast stone Coloroc floor and wall tile and other units used throughout the construction of fire-safe, vermin-proof and permanent buildings. In addition to this a true portland cement paint will be produced. This paint, known as Waitex, although comparatively new, has been finding its place as one of the best portland cement paints on the market, according to officials of the new industry in Portsmouth. Paul A. Kanengeiser and Patton Davis have operated under a partnership for the last year as the Superior Waitex Co. Recently with other associates they formed the Precast Concrete Co.

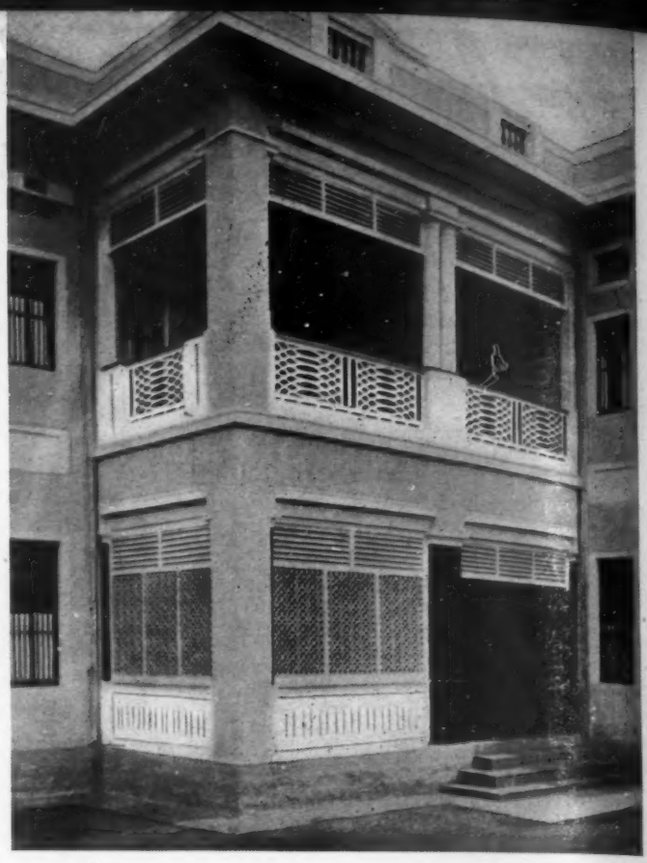
Concrete Joist Standards

DIVISION OF SIMPLIFIED PRACTICE OF THE NATIONAL BUREAU OF STANDARDS has announced that Simplified Practice Recommendation R87-32, Forms for Concrete Joist Construction Floors, has been reaffirmed without change by the standing committee of the industry.

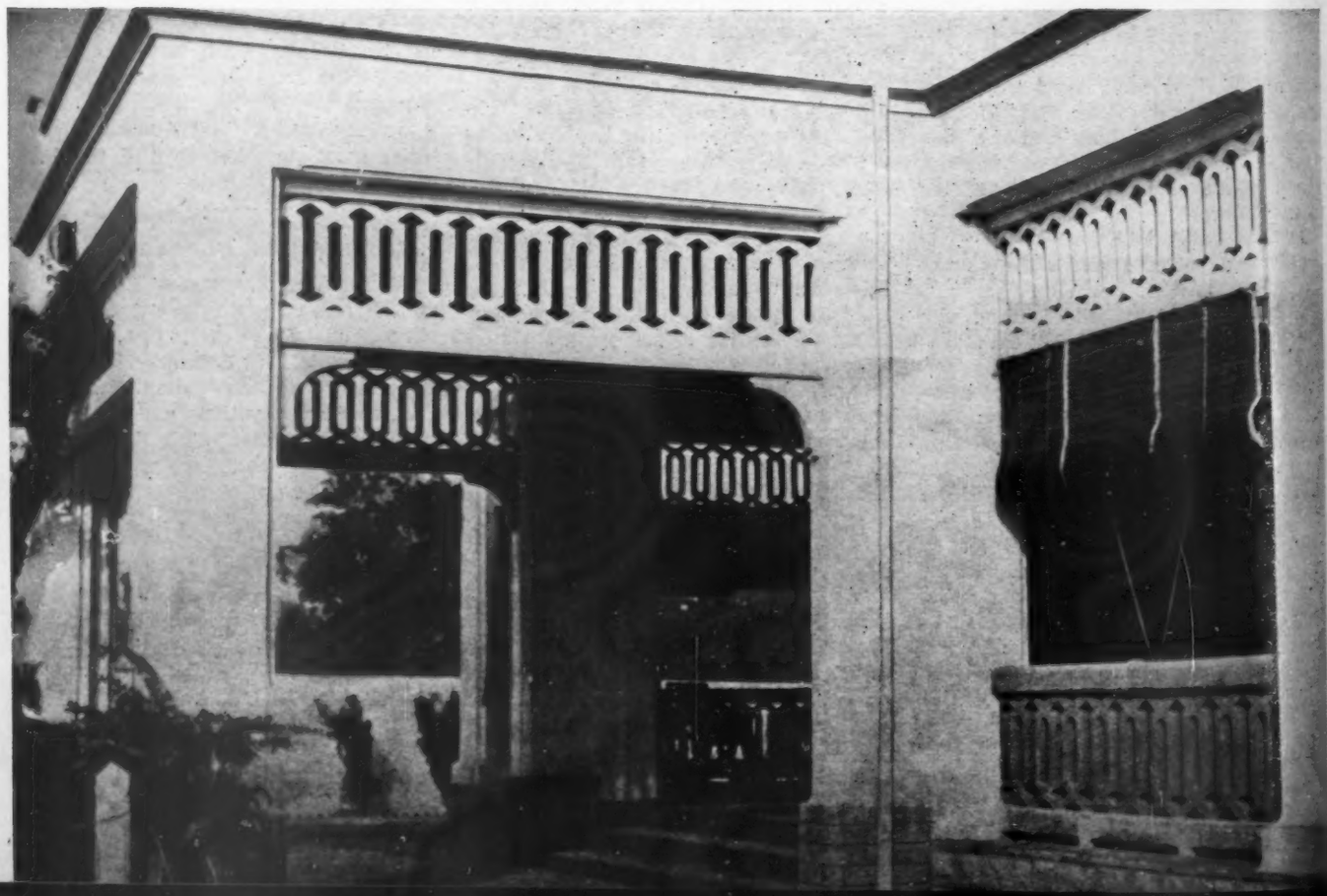
This recommendation, which covers the dimensions of standard and special forms for concrete joist construction floors, was originally effective from March 22, 1929, and the current revision was effective from May 1, 1932.

Copies of the recommendation may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., at five cents each.





Various designs executed in concrete mark the modern trend of architecture in India. Similar intricate work was formerly executed in stone and pottery. A modern material has not cheapened or degraded an ancient art. It has made it possible to build even more beautifully and with even greater permanency



Burned Clay Aggregate

GRAVELITE is the trade name of a new light-weight burned-clay aggregate used in the concrete pavement of the San Francisco - Oakland bay bridge, thereby avoiding a large dead load. The manufacturing process is described as follows:

Gravelite is a local product, it being developed by local research engineers and produced in a new, modern plant at Richmond. It is made by burning particles of clay and shale in such a manner as to cause them to expand into a light-weight material of unusual strength.

In manufacturing Gravelite, the clay is mined and ground, mixed with enough water to make it plastic and it is then forced through hardened steel dies under high pressure, these dies having holes of sizes corresponding to the sizes desired in the finished aggregate. As the pencils of clay are forced through these holes, they are cut off by rapidly rotating wires, producing small cylinders of clay.

These cylinders are then introduced into a rotating kiln where they are subjected to a high temperature which causes them to expand to more than twice their original size. It is this expansion of the particles of Gravelite which imparts lightness to the concrete and also its heat-insulating properties.

The crack-resistance of the concrete results from the fact that the particles of Gravelite are more resilient than sand or rock.

After being burned, the Gravelite is stored in large storage piles and before being shipped it is separated as to size, so that the user receives accurately-sized particles in accordance with his requirements.

The manufacturers are involved in litigation with the owners of the Haydite patents, which are claimed to cover the manufacture of any burned clay, light-weight aggregate in a rotary kiln.

Concrete Aggregates

THE DIVISION of Simplified Practice of the National Bureau of Standards has announced that printed copies of Simplified Practice Recommendation R163-36, Coarse Aggregates (Crushed Stone, Gravel and Slag), are now available. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5 cents each.

This simplified practice recommendation consists of two tables designated as Group A and Group B sizes of coarse aggregates. Each table gives size number, nominal size of square openings of sieves, and the amounts finer than each sieve (square openings), per cent by weight, for primary, and combined and modified sizes. Two tables showing typical uses for Group A and Group B sizes, and a table showing approximately equivalent round and square opening testing screens are included.

The recommendation was proposed by the Joint Technical Committee of the Mineral Aggregates Associations, which includes representatives of the three leading associations of producers of mineral aggregates.

This recommendation was approved for promulgation as of June 10, 1936, and is subject to regular review by a standing committee of the industry.

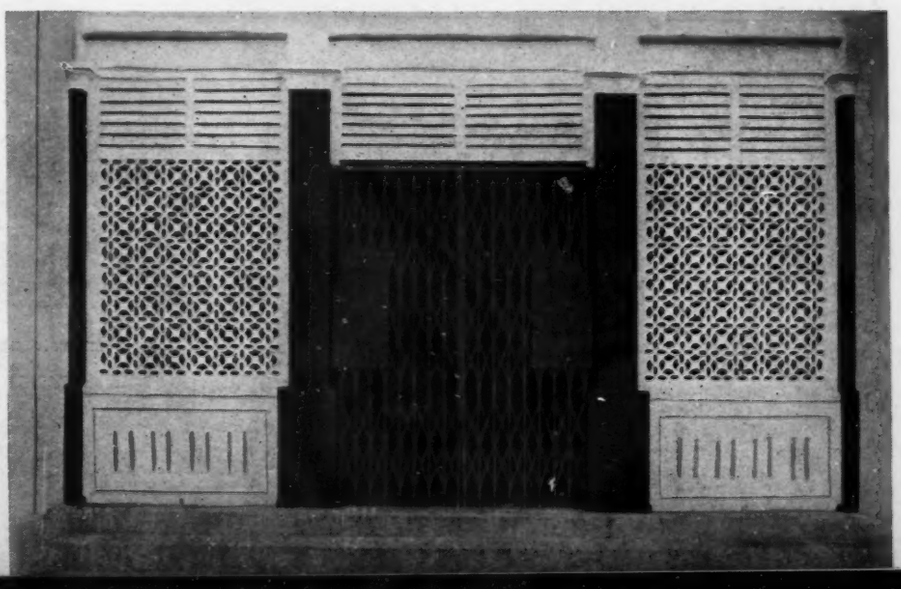
Concrete Pipe Plant

C. S. FAULL & Co., Durant, Okla., has established a plant to make concrete pipe for city's storm sewer project in the Wolbert Pecan building on South Second St. Pipe up to 36 in. in diameter will be manufactured.

Workmanship Counts

ON THESE two facing pages are reproduced some of the developments in reinforced-concrete architectural units made in India. These are from the October, 1936, issue of *The Indian Concrete Journal*. It is obvious that in accomplishing such work in reinforced-concrete, workmanship is all important. To duplicate it in America workmen who take real honest pride in their work must also be developed.

It would seem that the WPA and the CCC could very well spend a part of their money and energies training young men in such accomplishments, for if we are going to make the United States a finer place to live, the cultivation of such arts as this is not merely desirable but necessary. It is in such ways as this that local business men may be of immense help in shaping the future not only of industry but of society.



Latest House of Concrete

SITUATED in Shorewood Hills with a sweeping western view of Madison, Wis., the distinctly modern home of Dr. and Mrs. Joseph Gale is the first architectural concrete home of its kind in the midwest.

Although other new homes are being built with walls, floors and roofs cast as one integral unit of concrete, the Gale residence is the first to employ the combination of reinforced concrete and precast concrete slabs for wall construction.

Six-inch reinforced concrete makes up the core or inner wall which is faced on the exterior with precast concrete slabs 1½ in. thick and is faced on the interior with precast cinder concrete slabs 2 in. thick.

The double slab construction is started first. Spaced 6 in. apart, these exterior and interior slabs are held securely in place by metal tie or spacer bars. After three or four courses of the slabs have been erected, the 6-in space between them is filled with concrete—reinforced horizontally and vertically. In this method of construction the concrete slabs are used as forms which become a permanent part of the wall, providing greater strength and eliminating the need of wood forms which are removed when the concrete has set.

When the walls, floors and roof were completed the interior surfaces of the exposed cinder concrete slabs and the ceilings were sprayed with an inch of insulating material which also served as a plaster base.

It was designed by F. J. Brimeyer and George Kastner, Milwaukee, architects. Because of the unusual construction of this house, especially the wall construction, the Gales heated this large house of 37,000 cu. ft. for only $90, although it is swept by the cold winds blowing across Lake Mendota. The cost of this permanently constructed modern home was approximately $14,000.

Demonstration Home

INSULATED NATURAL STONE CO., Milwaukee, Wis., which makes a building block of cinder concrete faced with a thin veneer of sandstone, has shipped enough of its product by truck to Grand Rapids, Mich., to build a model demonstration home.

New Plant

LONGVIEW CONCRETE PRODUCTS CO., Longview, Texas, has built a plant near the Atkinson Canning Co. to make all kinds of concrete products. Will C. Hurst is president; L. P. Guice, vice-president; W. C. Hurst, Jr., secretary-treasurer and manager.

Two views of living room at Gale residence, near Madison, Wis.

Views of house having walls built of both reinforced concrete and precast unit slabs

For Today's Building Demands

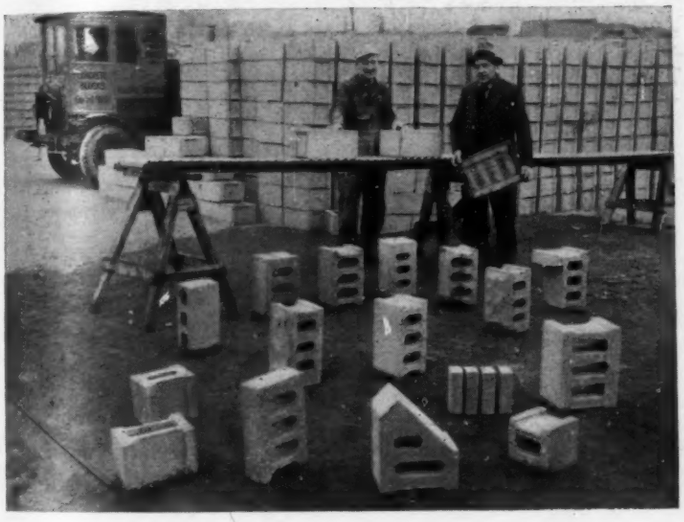
QUALITY

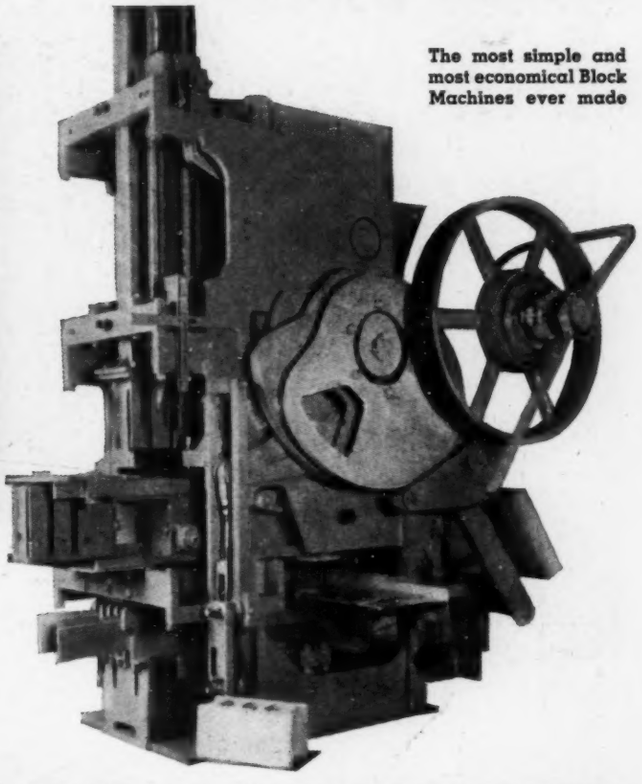
with

VARIETY OF SIZES

The new unit with fully pressed top. This is the most perfect unit ever made on any block machine

Otto Ladwig & Sons of Milwaukee, Wis., make all of the 16 units shown below on their Besser Plain Pallet Stripper, using only one set of plain pallets which cost less than $600





The most simple and most economical Block Machines ever made

They've Had Besser Equipment for Fifteen Years

Otto Ladwig & Sons of Milwaukee have been users of Besser Plain Pallet Strippers since they were first introduced—they replaced their face-down machines with Plain Pallet Strippers. They are making 16 different units on one set of plain pallets. This plant is a good example of what great savings in capital investment can be made by the use of Besser Plain Pallet Strippers. Cored pallets alone to make all the units made in this plant would have increased their equipment cost $15,000.00 or more.

You Can Reach Better Markets

Besser Plain Pallet Strippers with improved mold makes all units with fully pressed tops. These new units are the best ever turned out in production. They have the even face texture, true edges and perfect corners that builders are demanding for the better class construction. If you want to improve and broaden your market investigate these new units. Write or wire us today.

BESSER MANUFACTURING CO.

COMPLETE EQUIPMENT FOR CONCRETE PRODUCTS PLANTS

Complete Sales and Service on BESSER, ANCHOR, CONSOLIDATED, IDEAL, HOBBS, UNIVERSAL, PORTLAND

110 36th STREET ALPENA, MICHIGAN

BESSER PLAIN PALLET STRIPPERS

FULLY AUTOMATIC—3 Models—Capacities: 2000 to 4000 units per day.
SEMI-AUTOMATIC—4 Models—capacities: 1000 to 2000 units per day.
POWER OPERATED with
Hand Controls—2 Models—Capacities: 500 to 1000 units per day.
MULTI-MOLD
Hand Operated—Capacity: up to 300 units per day. For manhole blocks, slabs and small cored units.
AUTOMATIC BRICK MACHINES—Capacities from 10,000 to 50,000 units per day. For brick, slabs, coal cubes and other small units.

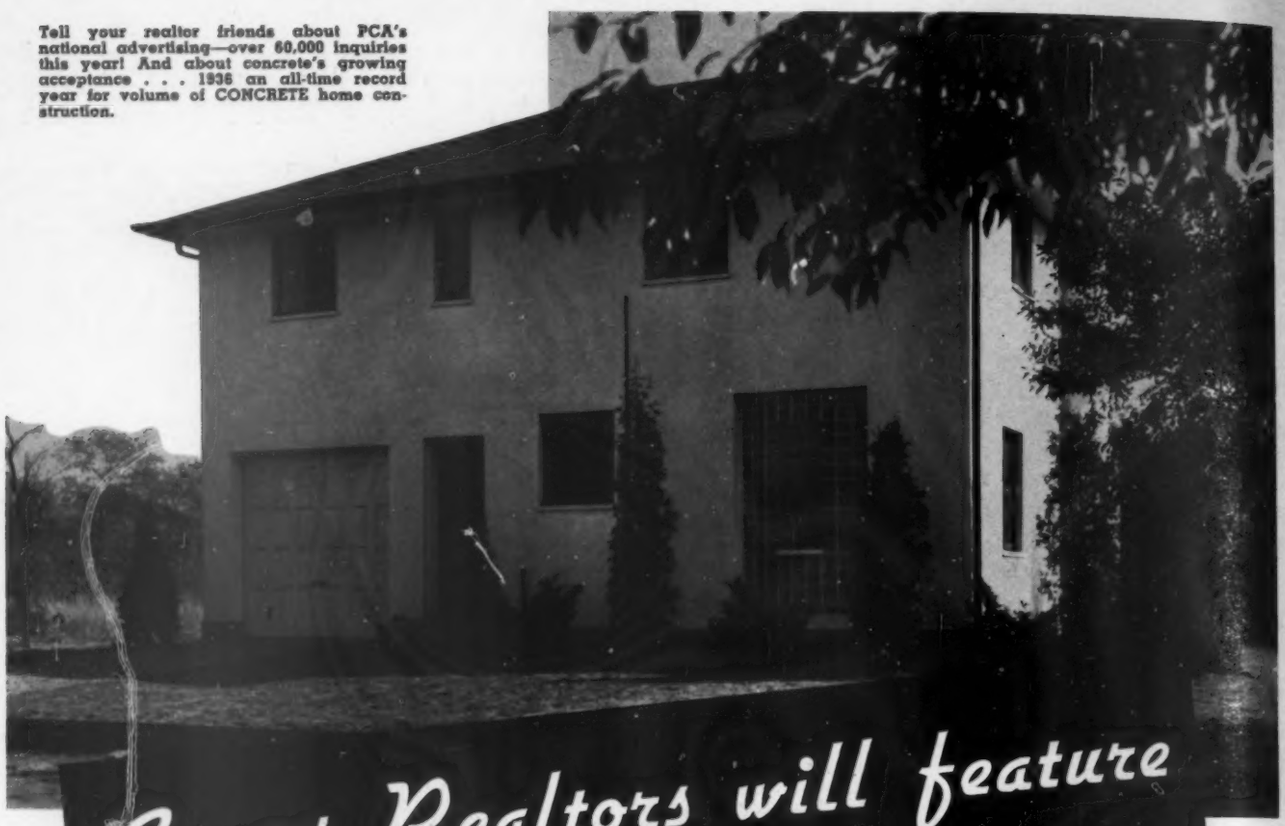
Besser Plain Pallet Strippers are made under one or more of the following Patents of which Besser Mfg. Co. is sole owner:

No. 1,472,399 by S. H. Pettengill
No. 1,572,305 by A. P. Nelson
No. 1,699,218 by J. H. Besser
No. 1,706,647 by J. H. Besser

These are the only patents ever granted on concrete stripper block machines using plain pallets, and they completely cover the basic plain pallet stripper principle. Other patents pending on improvements. No firm or individual is licensed or allowed to make machines under any of these patents.

EVERY CONCRETE PRODUCTS PLANT NEEDS A BESSER PLAIN PALLET STRIPPER

Tell your realtor friends about PCA's national advertising—over 60,000 inquiries this year! And about concrete's growing acceptance . . . 1936 an all-time record year for volume of CONCRETE home construction.



Smart Realtors will feature CONCRETE MASONRY HOMES *in 1937*

—IF you show them the many reasons why it is to their advantage

Beck, Pople & Beck, Pittsburgh, are featuring firesafe concrete homes in Swan Acres subdivision. 5 homes sold; 35 more are planned.

Buffett Holding Co., Inc., of West Englewood, New Jersey, will build a whole subdivision of concrete masonry homes similar to the one shown above.

A. J. King Realty Co. of Kansas City found enthusiastic buyers for 5 concrete homes. Entire sales force now behind a program of 25 houses of this modern construction.

Hundreds of other development firms everywhere will launch big programs in 1937. Many will feature concrete—*if!*

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PORTLAND CEMENT ASSOCIATION

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THE INDUSTRY

New Incorporations

Terre Haute Gravel Co., Terre Haute, Ind., has amended its charter to increase capital stock to 2000 shares of $100 par value.

Longview Concrete Products Co., Longview, Texas; capital stock $3000. Incorporators are Will C. Hurst, L. P. Guice and W. C. Hurst, Jr.

Donnelly Sand and Gravel Co., Cuyahoga Heights, Ohio; $5000. Incorporators are James C. Connell, Victor M. Todia and Mary E. Donnelly.

Spring Grove Sand & Gravel Co., Burlington, Iowa; capital stock $25,000, divided into 250 shares of $100 each. Incorporators are A. Dahlquist, R. B. Swift, F. O. Block

Chase Building Products, Inc., is the new name of Fort Worth Concrete Tile Co., Inc., Fort Worth, Texas, which has decreased capital stock from $15,000 to $5000.

Columbia Concrete Pipe Co., Yakima, Wash.; to deal in cement and cement products; $25,000. Incorporators are W. P. Hews and J. R. Sherman of Yakima, and W. F. Paddock of Seattle.

La Crosse Sand and Gravel Co., Inc., La Crosse, Wis.; to deal in building materials; 500 shares at $10 each. Incorporators are Edwin B. Mayer, Martin R. McDonald and Ralph C. Hartman.

Wilsea Corp., Knoxville, Iowa; to deal in sand, gravel, rock, coal, etc.; authorized capital stock, $10,000, consisting of 100 shares of $100 each. Incorporators are C. M. Wilson, Maude Wilson Rankin and H. G. Seager.

Personals

Lee R. Gardner, district manager for the Incor and Lone Star cement companies, Wichita Falls, Texas, is reported convalescing after having had pneumonia.

Harry McIntyre, who has been connected with Erwin Feldspar Co., Erwin, Tenn., for seven years, has been transferred to another plant of Consolidated Feldspar Corp. at Keystone, S. D., where he will be office manager.

Obituaries

David Follett, Sr., 83, a founder of the partnership of L. J. Follett and Sons, one-time lime manufacturers, Adams, Mass., died September 16. In 1901 the Follett business was sold to the New England Lime Co., and Mr. Follett continued with the new concern as assistant treasurer and treasurer until 1930, when he retired.

S. W. R. Dally, 76, president of the Orcas Lime Co., Seattle, Wash., died October 14 after a protracted illness.

Charles A. Patterson, 62, organizer and president of the Standard Sand Co., Cleveland, Ohio, died November 13 of a heart attack.

Ralph P. Wilton, president of the Steacy and Wilton Co., Wrightsville, Penn., and treasurer of the National Lime Association, died November 13.

James T. Skelly, 59, vice-president and a director of Hercules Powder Co., Wilmington, Del., died October 31 following an illness of six weeks.

L. P. Dillon, president of the James River Hydrate and Supply Co., Indian Rock, Va., died November 3, aged 63. He had for many years served on the board of directors of the National Lime Association.

Thomas P. Flynn, president of the Waushara Granite Quarries Co., Chicago, Ill., died November 3, at the age of 68. He had been associated with the granite company for 35 years.

Frank T. Mason, 56, president of the Pine Mountain Granite Co., Atlanta, Ga., died November 12. A native of Bronxville, N. Y., Mr. Mason came to Atlanta in 1902 and four years later founded the Pine Mountain Granite Co.

John S. McMillin, 80, president and founder of the Roche Harbor Lime and Cement Co., Roche Harbor, Wash., died November 3, after a 2-years' illness. He was a member of the National Lime Association's board of directors.

Walter S. Morrison, 69, traffic manager for the Great Lakes Portland Cement Co., Buffalo, N. Y., died October 31 of a heart attack. He had worked earlier as traffic manager of Oklahoma Portland Cement Co., of Denver Portland Cement Co., and of Indiana Portland Cement Co.

Daniel Ritchie Long, 46, district sales manager of the Pennsylvania-Dixie Cement Corp., New York, N. Y., died of heart attack November 3. He was a prominent figure in the cement industry for 25 years, being well known around St. Paul, Chicago, St. Louis, Kansas City and Birmingham.

R. F. Mather, vice president of the Pacific Lime Co., Ltd., Vancouver, B.C., was fatally hurt on the evening of October 21, when, in trying to visit one of the company's vessels, he accidentally fell between the ship and the dock, fracturing his skull. He died the next day.

Edward J. Maguire, vice-president and treasurer of the Medusa Portland Cement Co., Cleveland, Ohio, died November 10 of a heart attack. Mr. Maguire's connection with the Medusa Portland Cement Co. began in 1896, when he joined its forerunner, the old Sandusky Portland Cement Co., as secretary to one of its founders. In 1897, he was elected secretary of the concern and subsequently held other offices in the company and in various affiliated corporations. When the firm name was changed to Medusa Portland Cement Co. in 1928, he was elected vice-president and treasurer. He was also vice-president and treasurer and a director of the Manitowoc Portland Cement Co., the Newaygo Portland Cement Co., the Crescent Portland Cement Co. and the T.R.C. Corp.; and treasurer and director of the Cement Transit Co. A testimonial dinner celebrating his 40th anniversary with the Medusa organization was tendered him on July 13. (See ROCK PRODUCTS, August, 1936, p. 80.)

Quarries

Mt. Vernon, N. Y.: WPA has approved continuation of the stone quarry project on Sandford Blvd.

Grundy Center, Iowa: The WPA rock quarry in German township was reopened November 10 after a 3-months' shutdown.

California, Mo.: A quarry is being opened near High Point to produce agricultural limestone under an SCS program.

Charlotte, N. C.: The city has received bids on the rental and optional purchase of a stone crusher to be used at Charlotte airport.

Iola, Kan.: The Soil Conservation Service in the Elm Creek area reports production of 4305 tons of agricultural limestone since last spring.

Bronson, Kan.: A rock crusher has been set up for the government project on the Bronson-Porterfield road, and a second quarry further south is being operated.

Pawnee City, Neb.: The city has opened a rock quarry on the farm of Frank Groff northeast of town and will buy a crusher. Merle Howard is in charge.

Otto Wendling, Conesville, Iowa, contractor, has entered into an agreement with Muscatine county for stripping and hauling crushed rock at 35c a cubic yard from WPA quarries.

Osawatomie, Kan.: A rock quarry has been opened four miles south of Osawatomie and resurfacing of the Beagle-Parker road has been started. Rose Valley road is also to be resurfaced.

Fountain Green, Ill.: Rock at Meyer's quarry proved unsatisfactory for road construction, and the crushing equipment has been moved to a Hancock township quarry.

Norman, Okla.: The Oklahoma Geological Survey and Cleveland county officials are prospecting for limestone to be produced for agricultural purposes. Limestone now is being taken from east of Wynnewood.

Olathe, Kan.: The township rock crusher was moved recently to the Allison quarry southeast of town, and rock is being crushed for the road north from the W. S. Boehm farm.

Vinton, Iowa: Rock crushing for road material was started at Vinton quarry recently. The Garrison quarry has been closed, and the Shellsburg quarry will be opened when work ends at Vinton.

Mexico, Mo.: WPA has appropriated $6000 for limestone crushing in Audrain county, and work at the quarry on the Ellis brothers' farm on Highway 15 has been resumed. It is planned to locate several other quarries in the county soon.

Sandusky, Iowa: Two stone quarries—one located at Sandusky and a new quarry located on Sugar creek near the Wellman farm southwest of town—were opened early in November under WPA. This marks resumption of WPA work in Lee county.

Watertown, N. Y.: Vandals broke into the stone crushing plant of the town of Lyme, one mile south of Chaumont, on election night and caused $1000 damage. A 75-hp. motor and an electric hoist motor were pounded with a sledge hammer; and drive belts, hose and tires were slashed.

Gilman City, Mo.: The Harrison County Soil Conservation Association is sponsoring a limestone crushing project. Machinery is to be purchased and sites prospected. Work is under way at the Oram farm under WPA, where material for city streets is being produced.

Quartzite Stone Co., Lincoln, Kan., recently received an order for 10,000 to 12,000 tons of crushed rock, which, according to Superintendent J. R. Carlgren, will keep the plant in operation for six weeks. The company has been operating its plant irregularly since late summer, when it completed an order for rock for Highway US-24.

Dysart, Iowa: Tama county board of supervisors recently received notice from WPA officials to close the Smith stone quarry northeast of Dysart because of the dampness of the pit. Consequently, another quarry has been opened on No. 8, five miles east of Dysart in Benton county, on Jaben's quarry, and the machinery is being moved there.

Sand and Gravel

Fountain Green, Ill.: Gravel hauling for the Fountain Green-LaHarpe road, a WPA project, has started.

Tom Smart, Bemidji, Minn., is operating a sand and gravel pit to furnish material to contractors. He recently sold his dray and ice business.

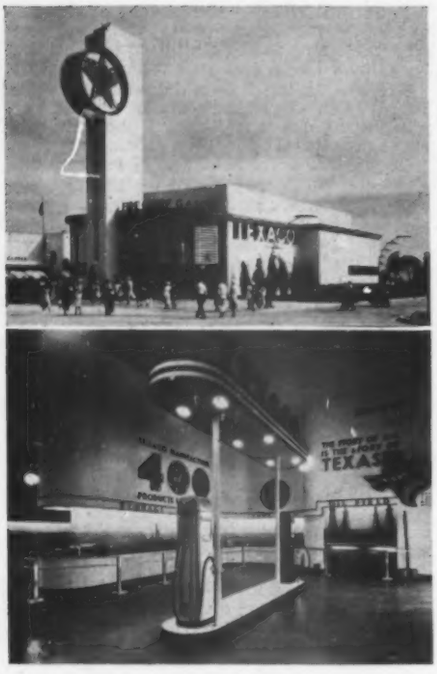
Mt. Gilead, Ohio: The Morrow county board of commissioners early in November purchased the gravel crushing plant of "Spud" Griffin in northern Morrow county for $3500.

Oconto, Wis.: With the acquisition of a new gravel crushing plant of 700 cu. yd. a day capacity, graveling of county trunk A and other roads is progressing. Two WPA gravel crushing plants will also be operated in the town of Brazeau on county trunk Z and on the town line road between Lena and Spruce.

Manufacturers

Tractor & Equipment Co., Chicago, Ill., announces appointment of C. A. Barabe, Rockford, Ill., as sales manager of its road machinery department and Illinois distributor for International Harvester TracTracTors.

Hercules Motors Corp., Canton, Ohio, has broadened its license agreement with N. V. Kromhout Motoren Fabriek of Amsterdam, Holland, whereby the latter may manufacture as well as distribute Hercules Diesel engines in Holland under Holland patents.



Exterior and interior view of Texas Co.'s exhibit at the Texas Centennial Exposition at Dallas, which recently closed

The Texas Co., New York, N. Y., had an interesting display at the Texas Centennial in Dallas, Texas, which was seen by thousands of visitors. Housed in its building at this exposition was a technically accurate miniature set-up depicting operations in the oil industry, from the preliminary geologic explorations on through to sealing of the product in cans. Actual working models of machinery were in the exhibit, as well as every one of the company's 400 products.

The Louis Allis Co., Milwaukee, Wis., announces appointment of C. J. Fechheimer as consulting engineer.

Harnischfeger Corp., Milwaukee, Wis., announces appointment of E. T. Slackford as advertising manager, succeeding Wood Sanford.

Chain Belt Co., Milwaukee, Wis., announces appointment of B. E. Sivyer, Jr., as branch manager at San Francisco, Calif., to succeed the late G. E. Taylor.

Wodack Electric Tool Corp., Chicago, Ill., recently completed arrangements for the manufacture of Wodack portable electric tools in England by **The Climax Rock Drill & Engineering Works, Ltd.**, London.

Bonney Forge & Tool Works, Allentown, Penn., announces that H. H. Cleveland, for 24 years associated with The Billings & Spencer Co., Hartford, Conn., has joined its tool sales staff.

The Babcock & Wilcox Co., New York, N. Y., announces appointment of J. S. Allison, Jr., as Chicago district manager of its refractories sales department, at 140 S. Dearborn St., Chicago, Ill.

Westinghouse Electric & Manufacturing Co., East Pittsburgh, Penn., announces election of David S. Youngholm as vice-president. He joined the organization 27 years ago. His headquarters is in New York.

American Brake Shoe & Foundry Co., New York, N. Y., announces election of William E. Crocombe as vice-president. Mr. Crocombe is president of the American Forge Co., Chicago, Ill., and of American Manganese Steel Co., Chicago Heights, Ill.

Productive Equipment Corp., Chicago, Ill., announces appointment of the Canadian Locomotive Co., Ltd., of Kingston, Ont., to manufacture and sell "Selectro" vibrating screens in Canada and the British colonies. A research laboratory has been established at the company offices in Chicago for solving screening problems.

Oliver United Filters, Inc., New York, N. Y., announces that J. F. Mitchell-Roberts, export manager, has just returned from a six-months' tour of the Far East, where he visited plants using Oliver United filters.

The Babcock & Wilcox Tube Co., Beaver Falls, Penn., announces promotion of W. W. Williams to general manager. T. F. Thornton, formerly sales manager of the Detroit district, succeeds Mr. Williams as general sales manager.

Westinghouse Electric and Manufacturing Co., East Pittsburgh, Penn., announces election of George H. Bucher as executive vice-president, with headquarters at Pittsburgh. He is also president and general manager of the Westinghouse Electric International Co.

Wright, Dolbear & Co., Ltd., 17 Battery Place, New York, N. Y., and 1102 Federal Bldg., Toronto, Ont., are a new firm of consulting mining engineers and geologists, organized by Lawrence B. Wright and Samuel H. Dolbear. Associated with them is also H. Foster Bain.

The Kropp Forge Co., Chicago, Ill., has elected Roy A. Kropp president, to succeed Chas. A. Kropp, who has resigned. The elder Mr. Kropp, who has headed the company since its establishment in 1901, will continue to be chairman of the board of directors.

Link-Belt Co., Chicago, Ill., has appointed P. B. Engstrom as distributor in southern California, with headquarters at the Los Angeles office, 361-369 S. Anderson St. B. Howard MacNeal has been transferred from Memphis, Tenn., to the office in Philadelphia, 2045 W. Hunting Park Ave.

Newark Wire Cloth Co., Newark, N. J., announces appointment of Harry G. Mouat to represent it in the Birmingham territory, with headquarters at Martin Bldg., Birmingham, Ala. W. C. Myers & Co. have been appointed representatives at Tulsa, with office at 8 N. Cheyenne St., Tulsa, Okla. The Pittsburgh, Penn., office has been discontinued.

Stearns Magnetic Manufacturing Co., Milwaukee, Wis., has announced a 5% bonus in the form of additional compensation for its employes. The company has opened a sales office in Philadelphia, Penn., at 369 Architects Bldg., with James Whiting in charge. The S. O. Otrich Co., 119 New Montgomery St., San Francisco, Calif., has been appointed a Stearns representative.

The Bristol Co., Waterbury, Conn., announces assignment of four graduate engineers to its field service organization: E. H. Hart, Consolidated Bldg., Boston, Mass.; J. N. Swarr, 220 E. 42nd St., New York, N. Y., to replace G. T. Evans, who has been promoted to the engineering department at Waterbury; K. J. Platt, Market Street National Bank Bldg., Philadelphia, Penn.; R. A. Barnes, Boatmen's Bank Bldg., St. Louis, Mo.

Trade Literature

The following literature is available upon request to the respective sponsor:

Diesel Power. An 8-page bulletin, No. 905, features economy, dependability, flexibility and safety of Buda Diesel engines. THE BUDA CO., Harvey, Ill.

Long Range Draglines. An 8-page bulletin describes and illustrates Models 702 and 802, draglines for wide range of operating flexibility. KOEHRING CO., Milwaukee, Wis.

Welders. Models SA-200 and SA-300, engine driven, are described in Bulletins 309 and 310, respectively. LINCOLN ELECTRIC CO., Cleveland, Ohio.

Wire Rope Slings. Macwhyte slings for lifting are illustrated in a 4-page bulletin. Various kinds, to speed up loading, are described. MACWHYTE CO., Kenosha, Wis.

Pipe Joints. Form 355, 16 pages, is an illustrated folder on Dresser couplings for water lines. S. R. DRESSER MANUFACTURING CO., Bradford, Penn.

Drives. Applications of and testimonials for vertical drives are presented in a 4-page bulletin, No. 26. ROCKWOOD MANUFACTURING CO., Indianapolis, Ind.

Dust Control. Bulletin 301, 4 pages, gives a complete description of Dracco multi-bag filter for dust control. DRACCO CORP., Cleveland, Ohio.

Gears. Standard listings, weights and dimensions on gears, sprockets and chain are listed in catalog 56-6 of 80 pages. MEDART CO., St. Louis, Mo.

Insulating Products. More than fifty J-M insulating products are described and illustrated in a 64-page vest-pocket size booklet, "Barriers to Industrial Waste." Tables of recommendations covering heating and power, ovens and dryers, heat treating furnaces, and non-ferrous smelting are included. JOHNS-MANVILLE, New York, N. Y.

Coupled Pumps. Bulletin 7066, 16 pages, deals with Cameron coupled pumps of capacities from 150 to 5000 g.p.m. against heads between 20 and 250 ft. INGERSOLL-RAND CO., Phillipsburg, N. J.

Storage Systems. Concrete pockets and conveying equipment for the storage and handling of sand, gravel, lime, etc., are discussed in a 20-page book. THE MARIETTA CONCRETE CORP., Marietta, Ohio.

Crushing Rolls. Bulletin 3627, superseding 2106 and 1107, gives, in 44 pages, diagrams and descriptions of crushing rolls and accessories. TRAYLOR ENGINEERING & MANUFACTURING CO., Allentown, Penn.

Drifters. CP-50, CP-60 and CP-70, three new drifters, featuring fast drilling speed and low air consumption, are featured in Bulletin 875, 4 pages. CHICAGO PNEUMATIC TOOL CO., New York, N. Y.

Dumps. A 4-page leaflet features the Dempster bucket dump, "built for brutal service." Time and money saving qualities are stressed. DEMPSTER BROS., INC., Knoxville, Tenn.

Pumps. Hydroseal pumps for sand, sludge or slurry, with Maximix soft rubber parts, are dealt with in a 24-page book. THE ALLEN-SHERMAN-HOFF CO., Philadelphia, Penn.

Safety Hat. The McDonald safety hat, featuring Dural crown, moulded brim, floating headband, chin strap lug and safety cradle, is described in a 4-page leaflet. DAVIS EMERGENCY EQUIPMENT CO., INC., Chicago, Ill.

V-Belt Drives. Two new data books, No. 782 for multiple groove drives and No. 783 for fractional horsepower single groove drives, cover in a simple manner, size ranges and prices. ROCKWOOD MANUFACTURING CO., Indianapolis, Ind.

Drives. Silent chain drives, flexible and chain couplings, and roller chains are illustrated and catalogued in a colorful 52-page booklet. A table of computation constants is included. MORSE CHAIN CO., Ithaca, N. Y.

"The Euclid Pioneer", 6 pages, in its current issue, features Trac-Truks for material handling and hauling. Installation photographs are reproduced, showing work of Trac-Truks. THE EUCLID ROAD MACHINERY CO., Cleveland, Ohio.

Coating Materials. "Thiokol" synthetic rubber coating material C-103, which is unaffected by the action of gasoline, oil and other solvents even after long periods of exposure, is described in a small folder. THIOKOL CORP., Yardville, N. J.

Synthetic Rubber. A 12-page, illustrated bulletin describes the properties of the new material, Koroseal, and lists various forms in which it is available and uses for which it is adaptable. THE B. F. GOODRICH CO., Akron, Ohio.

Welding Rod. Bulletin 10 is a folder describing Amsco nickel manganese steel welding rods. Illustrations are included. Bulletin 20 deals with Amsco hard-facing rods No. 459 and 217. AMERICAN MANGANESE STEEL CO., Chicago Heights, Ill.

Boilers. A 4-page bulletin, "Boiler Plant Equipment," gives a condensed summary of types of boilers, steam generating units and stokers. Line drawings are included. COMBUSTION ENGINEERING CO., INC., New York, N. Y.

Ball and Roller Bearing Transmission Appliances. A 32-page catalog shows load ratings and diagrams of mountings for pillow blocks, flanged housings, take-up boxes, floor stands, lockouts, etc. SKF INDUSTRIES, INC., Philadelphia, Penn.

Tools. A graphic index, detailed line drawings and complete engineering data showing sizes and tolerances of drilling, tapping, reaming and boiler tools are included in Catalog 105. SCULLY-JONES & CO., Chicago, Ill.

Stokers. Book 1619, 28 pages, deals with automatic coal stokers for industrial and commercial use in capacities up to 300 hp. The book is copiously illustrated and reproduces letters from users. LINK-BELT CO., Chicago, Ill.

"Research Illustrated." A graphic 32-page booklet presents findings of Houghton research on power transmission and packing problems. It discusses the relation of motor torque to belt stress, effect of pulsating loads on belts, etc. E. F. HOUGHTON & CO., Philadelphia, Penn.

Nickel Alloy Steels. "Buyers' Guide to Warehouse Stocks of Nickel Alloy Steels" is a directory naming the various dealers in all sections of the country together with a list of their respective nickel alloy steel products. THE INTERNATIONAL NICKEL CO., INC., New York, N. Y.

Conveyors. Form 504, 16 pages, describes standard Pioneer conveyors, heavy-service conveyors with plain or anti-friction bearings, conveyor accessories, portable conveyors and simplified engineering data for laying out conveyors. PIONEER GRAVEL EQUIPMENT MFG. CO., Minneapolis, Minn.

Material Handling Machinery. A new catalog of material handling equipment (112 pages) contains, besides descriptions of improvements in design and construction, many tables and drawings to aid in planning new or modernizing old material handling plants. GIFFORD-WOOD CO., Hudson, N. Y.

Material Handling Machinery. A neatly stapled "temporary" catalog presents bulletins on belt conveyors, idlers, bucket elevators, chain elevators, screens, etc. Interesting photographs of sand and gravel and crushed stone applications are shown. THE C. O. BARTLETT & SNOW CO., Cleveland, Ohio.

Refractories. A booklet has been issued giving engineering data, comparative tests and performance reports on refractory insulating brick recommended for use at temperatures up to 2500 deg. F. uncoated and up to 2600 deg. F. when coated with air-setting cement. CHAS. TAYLOR SONS CO., Cincinnati, Ohio.

Gaskets. Catalog 48, 64 pages, features metallic and semi-metallic gaskets, sheet and stuffing box packings, sealing compounds, gasket cutting tools, valve discs, filter screens and metal stampings. It includes halftones, blue prints and size and price data. GOETZ GASKET & PACKING CO., INC., New Brunswick, N. J.

Refractories. A booklet has been issued giving engineering data, comparative tests and performance reports on refractory insulating brick recommended for use at temperatures up to 2500° F. uncoated and up to 2600° F. when coated with air-setting cement. CHAS. TAYLOR SONS CO., Cincinnati, Ohio.

Laboratory Equipment. Catalog No. 7, printed on 80 sheets of good paper, well-bound and carefully prepared, gives specifications, prices and illustrations of all kinds of road materials testing equipment and laboratory apparatus, from asphalt drying ovens to wire gauze squares. The book is indexed. HUMBOLDT MANUFACTURING CO., Chicago, Ill.

Pumps. Double helical rotary pumps, types GS, GR, and GE, of simplest possible construction, are the subject of W-475--B8, 12 pages. Deep well turbine pumps, types Q and QA, for economical water supply, are described, diagrammed and illustrated in W-450-B19, 4 pages. Steam booster compressors to save the expense of extensive boiler alterations when high pressure or high temperature steam is required are shown in L-611-B3A, 4 pages. WORTHINGTON PUMP AND MACHINERY CORP., Harrison, N. J.

Diesel Locomotives. Designed particularly for underground service and for surface hauling where an economical locomotive is desired, the Ruth Diesel locomotive is described. THE RUTH CO., Denver, Colo.

Lubrication. Care of ball bearings, including "ten ball bearing commandments" and pointers on sleeve bearings, is covered in "Lubrication of Bearings in Electrical Machinery." IMPERIAL ELECTRIC CO., Akron, Ohio.

Switchgear. Metal-enclosed switchgear, designed to cut over-all switching costs, is the subject of leaflet GEK-86. GENERAL ELECTRIC CO., Schenectady, N. Y.

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OF THE

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The following figures were supplied in connection with the blast which is shown being prepared in the above illustration:

Pounds of dynamite used	8,250
Number of holes	34
Average depth of holes	48 ft.
Distance back from face	18 ft.
Total length of blast	476 ft.
Cordeau fuse used	1,675 ft.
Tons of rock displaced (Limestone)	31,600

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- ....Block, Chimney—Molds and Machines.
- ....Block Machines.
- ....Bodies, Motor Trucks.
- ....Boilers.
- ....Bolt Cutters.
- ....Bonding Compounds.
- ....Brick Machines.
- ....Brick Molds.
- ....Buckets.
- ....Buckets, Concrete.
- ....Bundling and Cleaning Machines, Sack.
- ....Buildings, Portable.
- ....Burial Vault Molds.
- ....Cable Coatings.
- ....Cableways.
- ....Calcining Machinery.
- ....Car Pullers.
- ....Car Replacers.
- ....Car Unloaders.
- ....Cars and Track.
- ....Carts, Concrete.
- ....Cement.
- ....Cement Brick Machines.
- ....Cement Colors.
- ....Chain Drive.
- ....Chains, Steel.
- ....Chimney Block Machines and Molds.
- ....Clamps and Ties, Form.
- ....Classifiers.
- ....Clips, Wire Rope.
- ....Clutches.
- ....Compressors.
- ....Concrete Chutes and Placers.
- ....Concrete Coatings and Paints.
- ....Concrete Conduit Machines.
- ....Concrete Hardeners.
- ....Concrete, Nailing.
- ....Conveying Equipment.
- ....Conveyors.
- ....Conveyor, Idlers and Rolls.
- ....Corn Crib Block and Tile Machines.
- ....Cranes, Crawler and Locomotive.
- ....Cranes, Traveling.
- ....Crushers.
- ....Crusher Parts.
- ....Crushing Plants.
- ....Culvert Forms and Molds.
- ....Curing Racks.
- ....Derricks.
- ....Drag Conveyors and Scrapers.
- ....Dragline Cableway Excavators.
- ....Dragline Excavators.
- ....Drain Tile Machines.
- ....Dredging Pumps.
- ....Drills, Blast Hole.
- ....Drills, Hand Hammer.
- ....Drill Sharpening Machinery.
- ....Drill Steel.
- ....Drills, Tripod.
- ....Dryers, Sand and Stone.
- ....Dynamite.
- ....Dump Bodies.
- ....Dump Cars.
- ....Dump Wagons.
- ....Dust Collecting Systems.
- ....Dustproofing.
- ....Elevators and Conveyors.
- ....Elevators, Portable Stacking.
- ....Elevating Equipment.
- ....Engineering Service.
- ....Engines, Diesel, Gas, Oil, Steam.
- ....Engineers, Designing and Consulting.
- ....Facing Materials.
- ....Feeders.
- ....Figures and Letters.
- ....Finishing Tools.
- ....Fire Brick.
- ....Floor Tile Machines.
- ....Floor and Roof Arches.
- ....Flooring.
- ....Flower Pot Machines.
- ....Forges.
- ....Form Oil.
- ....Form Oil Sprays.
- ....Forms.
- ....Frogs and Switches.
- ....Garbage and Ash Receptacle Molds.
- ....Garden Furniture Molds.
- ....Gas Producers.
- ....Gazing Globes.
- ....Gears.
- ....Gear Speed Reducers.
- ....Generators, Electric.
- ....Glaze, Cold.
- ....Hand Shovels.
- ....Hangers, Anchors and Inserts.
- ....Hoists, Chain and Monorail Systems.
- ....Hoisting Engines.
- ....Hoists, Elevators and Derricks.
- ....Hoists for Concrete Buckets.
- ....Hose, Air Drill.
- ....Hose, Pneumatic Tool.
- ....Hose, Steam.
- ....Hose, Water.
- ....Hydrated Lime.
- ....Hydraulic Dredges.
- ....Industrial Railways.
- ....Instruments, Builders.
- ....Instruments, Testing.
- ....Joist Machines.
- ....Laboratory Equipment.
- ....Laundry Tub Molds.
- ....Letters and Figures.
- ....Lights, Carbide.
- ....Lights, Roof and Sidewalk.
- ....Lime Kilns.
- ....Lime Hydrators.
- ....Loaders, Car, Truck and Wagon.
- ....Locomotive Cranes.
- ....Locomotives.
- ....Machine Shop Equipment.

*Firm Name*_____

*Individual*_____ *Title*_____

*Address*_____

*City*_____ *State*_____

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 2

Acetylene Welding Rod
American Steel & Wire Co. (U.S. Steel Corp. Subsidiary)

Aggregate De-dusters
Western Precipitation Co.

Agitators, Thickeners and Slurry Mixers
Hardinge Co., Inc.
Manitowoc Engr. Works
F. L. Smidth & Co.

Airveyor
Fuller Co.

Air Compressors
Fuller Co.
Ingersoll-Rand Co.
Nordberg Mfg. Co.
F. L. Smidth & Co.
Traylor Engr. & Mfg. Co.

Air Filters
Fuller Co.

Air Separators
Bradley Pulverizer Co.
Hardinge Co., Inc.
Raymond Bros. Impact Pulv. Co.
W. W. Sly Mfg. Co.
Sturtevant Mill Co.
Western Precipitation Co.

Applicator Bars
Stulz-Sickles Co.

Automatic Weighers
Richardson Scale Co.

Babbitt Metal
Joseph T. Ryerson & Son, Inc.

Backdiggers
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)

Backfillers
Austin-Western Road Machy. Co.
Bucyrus-Erie Co.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)

Bagging Machinery
Richardson Scale Co.

Ball Bearings
SKF Industries, Inc.

Balls, Grinding, (See Grinding Balls)

Balls (Tube Mill, etc.)
Allis-Chalmers Mfg. Co.
Hardinge Co., Inc.
F. L. Smidth & Co.

Bar Benders and Cutters
Koehring Co.

Batchers, Measuring Volume
Besser Mfg. Co.
Fuller Company

Bearings
Chain Belt Co.
Link-Belt Co.
Joseph T. Ryerson & Son, Inc.
SKF Industries, Inc.
Timken Roller Bearing Co.

Bearings (Anti-Friction)
SKF Industries, Inc.
Timken Roller Bearing Co.

Bearings (Roller)
SKF Industries, Inc.
Timken Roller Bearing Co.

Bearings (Tapered Roller)
Timken Roller Bearing Co.

Bearings (Thrust)
SKF Industries, Inc.
Timken Roller Bearing Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing (Steel)
Flexible Steel Lacing Co.

Belting
Robins Conveying Belt Co.

Belting (Elevator and Conveyor)
B. F. Goodrich Co.

Belting (Metal, Conveyor, High and Low Temperature)
Wickwire Spencer Steel Co.

Belting (Transmission)
B. F. Goodrich Co.

Belting (V Type)
B. F. Goodrich Co.

Bin Gates
Chain Belt Co.
Fuller Co.
Link-Belt Co.
Sprout, Waldron & Co., Inc.
Traylor Engr. & Mfg. Co.

Bins, Hoppers
Austin-Western Road Machy. Co. (Sand & Gravel)
Besser Mfg. Co.
Traylor Engr. & Mfg. Co.

Blasting Cap Protectors
B. F. Goodrich Co.

Blasting Machines
Atlas Powder Co.

Blasting Supplies
Atlas Powder Co.

Blasting Powder (See Powder, Blasting)

Block Machines, Building
Besser Mfg. Co.
Miles Mfg. Co.
Stearns Mfg. Co.

Block Machines, Silo
Besser Mfg. Co.

Blocks (Pillow, Roller Bearing)
Link-Belt Co.
SKF Industries, Inc.
Timken Roller Bearing Co.

Blocks (Sheave)
American Manganese Steel Co.

Blowers
W. W. Sly Mfg. Co.

Bodies (Car & Motor Truck)
Easton Car & Construction Co.

Boilers
Babcock & Wilcox Co.
Combustion Engineering Corp.

Boots and Shoes
B. F. Goodrich Co.

Breakers (Primary)
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Brick Machines
Besser Mfg. Co.

Bucket Dumps
Dempster Bros., Inc.

Buckets (Clamshell, Grab, Orange Peel, etc.)
Geo. Haiss Mfg. Co., Inc.
Hayward Company
Link-Belt Co.
Owen Bucket Co.

Buckets (Dragline and Slackline)
American Manganese Steel Co.
Bucyrus-Erie Co.
Owen Bucket Co.
Page Engineering Co.
Wellman Engineering Co. (G. H. Williams)

Buckets (Dredging and Excavating)
Owen Bucket Co.

Buckets (Elevator and Conveyor)
Chain Belt Co.
Cross Engr. Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
Robins Conveying Belt Co.
Taylor-Wharton Iron & Steel Co.

Bulldozers
Koehring Co.

Cableways
American Steel & Wire Co. (U.S. Steel Corp. Subsidiary)
Broderick & Bascom Rope Co.
Link-Belt Co.
John A. Roebling's Sons Co.
Wellman Engineering Co. (G. H. Williams)
Williamsport Wire Rope Co.

Calcinators
Bradley Pulverizer Co.

Calcining Kettles (Gypsum)
J. B. Ehrsam & Sons Mfg. Co.

Cap Crimpers and Fuse Cutters
Ensign-Bickford Co.

Caps (Blasting)
Atlas Powder Co.

Car Pullers
Link-Belt Co.

Carriers
Barber-Greene Co.

Cars and Track, Industrial
Besser Mfg. Co.
Chase Foundry & Mfg. Co.

Cars (Quarry & Gravel Pit)
Austin-Western Road Machy Co.
Easton Car & Construction Co.

Castings
Babcock & Wilcox Co.
Eagle Iron Works (Grey Iron)
Link-Belt Co.
Timken Roller Bearing Co.

Cement Making Machinery
Manitowoc Engr. Works
F. L. Smidth & Co.

Cement Paints
Tamms Silica Co.

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
F. L. Smidth & Co.

Central Mixing Plants (Concrete)
Chain Belt Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.

Chain Drives
Chain Belt Co.

Chain (Elevating and Conveying)
American Manganese Steel Co.
Chain Belt Co.
Link-Belt Co.

Chain Systems (Kilns)
F. L. Smidth & Co.

Chimney Block Machines and Molds
Besser Mfg. Co.

Chute or Launder Lining
B. F. Goodrich Co.

Chutes and Chute Liners
American Manganese Steel Co.
Cross Engr. Co.

Clarifiers
Hardinge Co., Inc.

Classifiers
Deister Concentrator Co.
Hardinge Co., Inc.
Link-Belt Co.

Clay Working Machinery
Bonnot Company

Clips (Wire Rope)
American Steel & Wire Co. (U.S. Steel Corp. Subsidiary)
Broderick & Bascom Rope Co.
Williamsport Wire Rope Co.

Coal Crushers and Rolls
Austin-Western Road Machy. Co.
Williams Patent Crusher & Pulv. Co.

Coal Pulverizing Equipment
Babcock & Wilcox Co.
Bonnot Company
Bradley Pulverizer Co.
Gruendler Crusher & Pulv. Co.
Pennsylvania Crusher Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Williams Patent Crusher & Pulv. Co.

Colors, Cement
Geo. S. Mepham Corp.
Tamms Silica Co.

Compressed Air Rock Drills
Cleveland Rock Drill Co.

Compressors (See Air Compressors)

Concentrators
Deister Concentrator Co.

Concrete Breakers
Ingersoll-Rand Co.

Concrete Pipe Machinery
Universal Concrete Pipe Co.

Concrete Slab Raising Equipment (Mud-Jack)
Koehring Co.

Conveyor Belting (See Belting)

Conveyor Idlers and Rolls
Barber-Greene Co.
Chain Belt Co.
Link-Belt Co.

Conveyors and Elevators
Earle C. Bacon, Inc.
Barber-Greene Co.
Besser Mfg. Co.
Chain Belt Co.
Fuller Company
Jeffrey Mfg. Co. (Vibrating)
Lewistown Fdy. & Mach. Co.
Link-Belt Co.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.

Conveyors (Pneumatic)
Fuller Company

Conveyors (Screw)
Link-Belt Co.

Conveyoweighs
Richardson Scale Co.

Coolers (See Kilns and Coolers, Rotary)

Correcting Basins
F. L. Smidth & Co.

Couplings (Air Hose)
Cleveland Rock Drill Co.
Ingersoll-Rand Co.

Couplings (Flexible and Shaft)
Chain Belt Co.
Link-Belt Co.

Couplings (Hose, Pipe, etc.)
B. F. Goodrich Co.

Cranes (Clamshell)
Austin-Western Road Machy. Co.
Bay City Shovels, Inc.

Classified Directory—*Continued*

Bucyrus-Erie Co.
Koehring Co.
Manitowoc Engr. Works

Cranes (Crawler and Locomotive)
Austin-Western Road Machy. Co.
Bay City Shovels, Inc.
Bucyrus-Erie Co.
Koehring Co.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)
Link-Belt Co.
Manitowoc Engr. Works
Michigan Power Shovel Co.
Northwest Engineering Co.

Cranes (Excavator)
Koehring Co.

Crusher Parts
American Manganese Steel Co.
American Pulverizer Co.
Pennsylvania Crusher Co.
Taylor-Wharton Iron & Steel Co.

Crushers (Hammer)
Austin-Western Road Machy. Co.
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Pennsylvania Crusher Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Earle C. Bacon, Inc.
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Lewistown Fdy. & Mach. Co. (Jaw)
Nordberg Mfg. Co.
Pennsylvania Crusher Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Crushers (Reduction)
Bonnot Company
Jeffrey Mfg. Co.

Crushers (Roll)
Gruendler Crusher & Pulv. Co.

Crushers (Rotary)
American Pulverizer Co.
J. B. Ehrsam & Sons Mfg Co.

Crushers (Single Roll)
American Pulverizer Co.
Austin-Western Road Machy. Co.
Gruendler Crusher & Pulv. Co.
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.

Crushing Rolls
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.

Cupolas (Rock Wool)
Whiting Corp.

Detonators
Atlas Powder Co.

Diaphragms (Pump)
B. F. Goodrich Co.

Dippers (Manganese Steel)
American Manganese Steel Co.
Taylor-Wharton Iron & Steel Co.

Dippers and Teeth (Steam Shovel)
American Manganese Steel Co.
Bucyrus-Erie Co.
The Frog, Switch & Mfg. Co.

Dirt Moving Equipt. (Dumptor)
Koehring Co.

Ditchers
Barber-Greene Co.
Bucyrus-Erie Co.

Draglines
Bay City Shovels, Inc.
Bucyrus-Erie Co.
Link-Belt Co.
Manitowoc Engr. Works
Northwest Engineering Co.
Page Engineering Co.

Draglines (Gasoline or Electric)
Koehring Co.
Manitowoc Engr. Works

Dragline Cableway Excavators
Bucyrus-Erie Co.
Link-Belt Co.
Sauerman Bros., Inc.

Dragline Excavators
Austin-Western Road Machy. Co.
Bay City Shovels, Inc.
Bucyrus-Erie Co.
Lima Locomotive Works, Inc. (Ohio Power Shovel Co.)
Michigan Power Shovel Co.
Northwest Engineering Co.
Page Engineering Co.

Dredge Pumps (See Pumps, Dredging)

Dredges
Bucyrus-Erie Co.
Hayward Co.
Hetherington & Berner, Inc. (Complete Steel)
Morris Machine Works

Dredging Sleeves
B. F. Goodrich Co.

Drill Bits
Ingersoll-Rand Co.
Timken Roller Bearing Co.

Drill Sharpening Machines
Ingersoll-Rand Co.

Drill Sharpening Service
A. Courchesne, Inc.

Drill Steel
Cleveland Rock Drill Co.
Ingersoll-Rand Co.

Drilling Accessories
Cleveland Rock Drill Co.

Drills
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drills (Diamond Core)
Chicago Pneumatic Tool Co.
Ingersoll-Rand Co.

Drills, Hammer (See Hammer Drills)

Drills (Rock)
Cleveland Rock Drill Co.
A. Courchesne, Inc.
Ingersoll-Rand Co.

Drills (Tripod)
Cleveland Rock Drill Co.

Drills (Wagon)
Cleveland Rock Drill Co.
Ingersoll-Rand Co.

Drives (Short Center)
Allis-Chalmers Mfg. Co.

Dryers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Bonnot Company
Combustion Engineering Corp.
Hardinge Company, Inc.
Manitowoc Engr. Works
Traylor Engr. & Mfg. Co.

Dumptors
Koehring Co.

Dust Arresters
The American Fdy. Equip. Co.
W. W. Sly Mfg. Co.
Western Precipitation Co.

Dust Collecting Systems
Allis-Chalmers Mfg. Co.
The American Fdy. Equip. Co.
Western Precipitation Co.

Dust Conveying Systems
Fuller Company

Dynamite
Atlas Powder Co.

Electric Cables and Wires
American Steel & Wire Co. (U.S. Steel Corp. Subsidiary)
John A. Roebling's Sons Co.

Electric Mine Hoists
Nordberg Mfg. Co.

Electric Power Equipment
Allis-Chalmers Mfg. Co.

Elevator Belting (See Belting)

Emery Mills
Sturtevant Mill Co.

Engineers
Bonnot Company
Fuller Co.
Hetherington & Berner, Inc.
Productive Equipment Corp.
Robins Conveying Belt Co.
F. L. Smidth & Co.
Sturtevant Mill Co.

Engines (Diesel)
Ingersoll-Rand Co.
Nordberg Mfg. Co.

Engines (Steam)
Morris Machine Works

Excavating Machinery (See Shovels, Cranes, Buckets, etc.)

Excavators (Crawling Tractor)
Koehring Co.

Excavators (Dragline)
Bay City Shovels, Inc.
Koehring Co.

Explosives
Atlas Powder Co.

Fans
W. W. Sly Mfg. Co. (Exhaust)

Feeders
Babcock & Wilcox Co. (Pulverized Coal)
Besser Mfg. Co.
Chain Belt Co.
Fuller Co. (Cement and Pulverized Material)
Hardinge Company, Inc. (Weighing)
Robins Conveying Belt Co.
Smith Engineering Works (Plate)
Stearns Mfg. Co.

Filters (Air)
W. W. Sly Mfg. Co.

Filters (Dust)
W. W. Sly Mfg. Co.

Forgings
Manganese Steel Forge Co., Inc. (Steel)
Taylor-Wharton Iron & Steel Co.

Frogs and Switches
Taylor-Wharton Iron & Steel Co.

Furnaces
Combustion Engineering Corp.

Fuses (Detonating and Safety)
Ensign-Bickford Co.

Gaskets
B. F. Goodrich Co.

Gasoline
Texas Company

Gazing Globes
American Thermo-Ware Co.

Gears (Spur, Helical and Worm)
Taylor-Wharton Iron & Steel Co.

Gears and Pinions
Chain Belt Co.
Link-Belt Co.
Taylor-Wharton Iron & Steel Co.

Gelatin and Semi-Gelatin (See Explosives)

Grapples
Owen Bucket Co.

Grease
Gulf Refining Co.
Texas Company

Grinding Balls
Babcock & Wilcox Co.

Grizzlies
American Manganese Steel Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
Smith Engineering Works
Traylor Engr. & Mfg. Co.

Grizzly Feeders
Traylor Engr. & Mfg. Co.

Hammer Drills
Cleveland Rock Drill Co.
Ingersoll-Rand Co.

Hammer Mills (See Crushers)

Hoists
Ingersoll-Rand Co.
Link-Belt Co.
Northwest Engineering Co.

Hose (Water, Steam, Air Drill, Pneumatic, Sand Suction and Discharge)
Cleveland Rock Drill Co.
B. F. Goodrich Co.
Ingersoll-Rand Co.

Hose Couplings (See Couplings—Hose, Pipe, etc.)

Kilns and Coolers (Rotary)
Allis-Chalmers Mfg. Co.
Bonnot Company
Hardinge Co., Inc.
Manitowoc Engr. Works
F. L. Smidth & Co.
Traylor Engr. & Mfg. Co.

Kominuters (See Mills)

Laboratory Crushers
Sturtevant Mill Co.

Lamp Guards
Flexible Steel Lacing Co.

Lighters, Hot Wire (For Safety Fuse)
Ensign-Bickford Co.

Lime Handling Equipment
Fuller Company
Hardinge Co., Inc.
Link-Belt Co.
Raymond Bros. Impact Pulv. Co.

Lime Kilns (See Kilns and Coolers, Rotary)

Linings (Iron for Ball and Tube Mills) (See Mill Liners)

Linings (Rubber for Chutes, Ball and Tube Mills, Tank and Pipe)
B. F. Goodrich Co.

Loaders and Unloaders
Barber-Greene Co.
Bucyrus-Erie Co.
Fuller Company
Geo. Haiss Mfg. Co., Inc.
Link-Belt Co.
Northwest Engineering Co.

Locomotive Cranes (See Cranes, Crawler and Locomotive)

Locomotives (Diesel)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Diesel-Electric)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Gas-Electric)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Oil-Electric)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Steam, Gas and Electric)
Plymouth Locomotive Works (Gas)

Log Washer
McLanahan & Stone Corp.
Smith Engineering Works

Lubricants
American Steel & Wire Co. (U.S. Steel Corp. Subsidiary)
Broderick & Bascom Rope Co. (Wire Rope)
Gulf Refining Co.
Texas Company

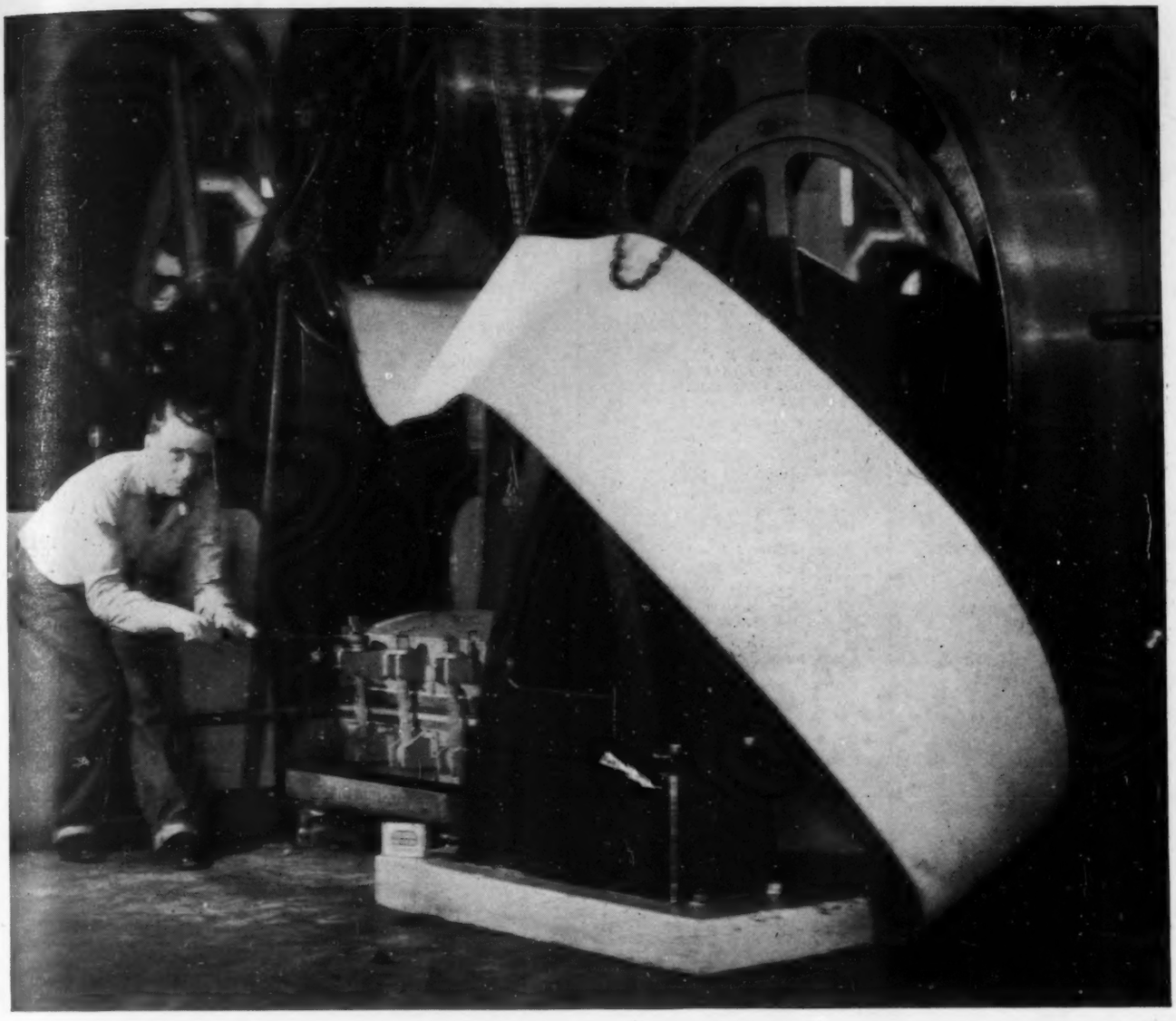
Machinery Guards
Harrington & King Perf. Co.

Magnetic Pulleys
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.

Manganese Steel (Plates and Sheets)
Manganese Steel Forge Co., Inc.

Manganese Steel Castings
American Manganese Steel Co.
The Frog, Switch & Mfg. Co.
Taylor-Wharton Iron & Steel Co.

Manganese Steel Parts
American Manganese Steel Co.
Taylor-Wharton Iron & Steel Co.



HE MAKES THE BELT SWALLOW ITS TAIL

A typical example of Goodrich improvement in rubber

FOR 40 years manufacturers tried to find a better way to make rubber belts endless.

Splices, vulcanized like tire repairs, would hold for a short time, then begin to open up at the seams. Plan after plan was tried, each plan designed to make splices *stronger and stronger*. Joints were made which seemed stronger than any other part of the belt! Still they failed.

One day Goodrich belt men decided that strength alone wasn't the answer. The outside belt plies must stand quick stretching and relaxing millions of times. Belts travel so fast that air resistance is important. These men decided they must protect those outer seams at any cost. So they reversed the usual engineering procedure, designed a splice in which a small section of an inner ply is removed, the outside ply carried under the surface at the seam, and covered with elastic breaker fabric.

Belts with this new Plylock splice lasted sometimes twice as long, sometimes ten times as long as the old belts. Users constantly tell us of serious belting problems which have been completely solved.

Goodrich is always busy with development work on rubber products. Much of it applies to new products, new uses —but no product is too "staple" or too *standardized* to get its share of this work. Goodrich improvements in rubber extend to conveyor belts, rubber-lined pipe, steam hose, suction hose—hundreds of other things classed generally as mechanical rubber goods. The B. F. Goodrich Company, Mechanical Rubber Goods Division, Akron, Ohio.

Goodrich

ALL *products problems* IN RUBBER

Classified Directory—*Continued*

Manganese Welding Rod
Taylor-Wharton Iron & Steel Co.

Mechanical Rubber Goods
B. F. Goodrich Co.

Mill Liners and Linings (Iron for Ball and Tube Mills)
Babcock & Wilcox Co.
Hardinge Co., Inc.
F. L. Smidth & Co.

Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)
Allis-Chalmers Mfg. Co.
American Pulverizer Co.
Bonnot Company
Bradley Pulverizer Co.
Gruendler Crusher & Pulv. Co.
Hardinge Co., Inc.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Traylor Engr. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

Mine Handling Equipment
Chain Belt Co.

Mixers (Commercial Concrete)
Jaeger Machine Co.

Mixers (Concrete)
Besser Mfg. Co.
Gruendler Crusher & Pulv. Co.
Jaeger Machine Co.
Koehring Co.

Mortar Colors
Geo. S. Mepham Corp.
Tamms Silica Co.

Motors and Generators (Electric Units)
Allis-Chalmers Mfg. Co.

Nozzles (Gravel Washing)
Chain Belt Co.

Oil Burners
Babcock & Wilcox Co.
F. L. Smidth & Co.

Oils (Lubricating)
Gulf Refining Co.
Texas Company

Packings (Pump, Valve, etc.)
B. F. Goodrich Co.

Paint (Asphalt)
Texas Company

Pallets
Besser Mfg. Co.
Commercial Shearing and Stamping Co.

Pavers (Concrete)
Koehring Co.

Perforated Metal
Chicago Perforating Co.
Cross Engineering Co.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Taylor-Wharton Iron & Steel Co. (Manganese)
Wickwire Spencer Steel Co.

Pipe Machines
Besser Mfg. Co.

Pipe Molds (Concrete)
Besser Mfg. Co.
Stearns Mfg. Co.
Universal Concrete Pipe Co.

Plates (Double Corrugated)
Hendrick Mfg. Co.

Pneumatic Drills (See Drills)

Portable Compressors
Ingersoll-Rand Co.

Portable Conveyors
Barber-Greene Co.
Fuller Company
Geo. Haiss Mfg. Co., Inc.
Link-Belt Co.

Portable Crushing and Screening Unit
Austin-Western Road Machy. Co.
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Powder (Blasting)
Atlas Powder Co.

Power Tampers
Besser Mfg. Co.

Power Transmission Machinery
Chain Belt Co.
SKF Industries, Inc.

Pulleys, Magnetic (See Magnetic Pulleys)

Pulverators
Allis-Chalmers Mfg. Co.

Pulverizers (See also Crushers, Mills, etc.)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
Bonnot Company
Bradley Pulverizer Co.
Dixie Machy. Mfg. Co.
Gruendler Crusher & Pulv. Co.
Hardinge Co., Inc.
Pennsylvania Crusher Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Sturtevant Mill Co.
Williams Patent Crusher & Pulv. Co.

Pulverizer Parts
American Manganese Steel Co.

Pumps (Air Lift)
Fuller Company

Pumps (Cement)
Fuller Company

Pumps (Cement Slurry)
American Manganese Steel Co.
Morris Machine Works
F. L. Smidth & Co.
A. R. Wilfley & Sons

Pumps (Centrifugal)
Allis-Chalmers Mfg. Co.
Hetherington & Berner, Inc.
Ingersoll-Rand Co.
Morris Machine Works
A. R. Wilfley & Sons

Pumps (Dredging)
American Manganese Steel Co.
Bucyrus-Erie Co.
Morris Machine Works

Pumps (Pulverized Coal)
Babcock & Wilcox Co.

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Hetherington & Berner, Inc.
Morris Machine Works
A. R. Wilfley & Sons

Quarry Cars
Easton Car & Const. Co.

Racks or Decks for Lift Trucks
Besser Mfg. Co.
Chase Fdy. & Mfg. Co.

Recovery Plants (Dust)
W. W. Sly Mfg. Co.

Reciprocator Feeder for Unloading Hopper Bottom Cars
Besser Mfg. Co.

Recuperators
Manitowoc Engr. Works

Reinforcement Fabric (Concrete)
Wickwire Spencer Steel Co.

Road Machinery
Barber-Greene Co.
Koehring Co.
Northwest Engineering Co.

Rock Bits (See Drill Bits)

Rock Drills (See Drills, Rock)

Rock Wool Machinery
Whiting Corp.

Rod Mills
Hardinge Co., Inc.
Traylor Engr. & Mfg. Co.

Rods (Wire)
Wickwire Spencer Steel Co.

Roller Bearings
SKF Industries, Inc.
Timken Roller Bearing Co.

Roofing (Ready to Lay)
Texas Company

Roofing and Siding (Steel)
Joseph T. Ryerson & Son, Inc.

Rope, Wire (See Wire Rope)

Rubber Covered Screens
B. F. Goodrich Co.

Sack Balers
Besser Mfg. Co.

Sandblast Equipment
W. W. Sly Mfg. Co.

Sand Drag
Smith Engineering Works

Sand and Gravel Handling Equipt.
Sprout, Waldron & Co., Inc.

Sand Settling Tanks
Link-Belt Co.
Smith Engineering Works

Scales (Automatic Proportioning)
Richardson Scale Co.

Scales (Cement)
Richardson Scale Co.

Scrapers (Power Drag)
Austin-Western Road Machy. Co.
Link-Belt Co.
Northwest Engineering Co.
Sauerman Bros., Inc.

Screens
Allis-Chalmers Mfg. Co.
American Manganese Steel Co.
Earle C. Bacon, Inc.
Besser Mfg. Co.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
Cross Engineering Co.
Hardinge Co., Inc.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Link-Belt Co.
National Wire Cloth Co.
Nordberg Mfg. Co.
Simplicity Engineering Co.
Robins Conveying Belt Co.
John A. Roebling's Sons Co.
Smith Engineering Works
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
Universal Vibrating Screen Co.

Screens, Scalping (Hercules and Standard)
Smith Engineering Works

Screens (Vibrating)
Austin-Western Road Machy. Co.
Deister Concentrator Co.
Link-Belt Co.
Nordberg Mfg. Co.
Robins Conveying Belt Co.
Simplicity Engineering Co.
Smith Engineering Works
Sturtevant Mill Co.
W. S. Tyler Co.
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens, Washing (Hercules, Ajax and Standard)
Smith Engineering Works

Screens (Woven Wire)
Wickwire Spencer Steel Co.

Screw Conveyors
Besser Mfg. Co.

Screw Rewasher (Single and Twin)
Smith Engineering Works

Scrubbers, Washers
Allis-Chalmers Mfg. Co.
Hardinge Company, Inc.
Smith Engineering Works

Seal Rings
Traylor Engr. & Mfg. Co.

Separators (Magnetic)
Birdsboro Steel Foundry & Mach. Co.
C. G. Buchanan Co., Inc.

Separators (Slurry)
F. L. Smidth & Co.

Shovels, Power (Steam, Gas, Electric, Diesel, Oil)
Bay City Shovels, Inc.
Bucyrus-Erie Co.
Koehring Co.
Lima Locomotive Works (Ohio Power Shovel Co.)
Link-Belt Co.
Manitowoc Engr. Works
Northwest Engineering Co.

Shovel Repair Parts
Taylor-Wharton Iron & Steel Co.

Silos
F. L. Smidth & Co.

Skip Hoists and Skips
Link-Belt Co.

Slings (Wire Rope)
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary)
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Sockets (Wire Rope)
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary)

Special Aggregates
Tamms Silica Co.

Speed Reducers
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Springs (Extension, Compression, Torsion or Flat)
Wickwire Spencer Steel Co.

Sprockets and Chain
Chain Belt Co.
Taylor-Wharton Iron & Steel Co.

Steam Shovel Repair Parts
American Manganese Steel Co.

Steel Bars
Timken Roller Bearing Co.

Steel (Bars, Shapes, Plates, etc.)
Joseph T. Ryerson & Son, Inc.

Steel (Electric Furnace)
Timken Roller Bearing Co.

Steel (Open Hearth)
Timken Roller Bearing Co.

Steel (Special Alloy)
Timken Roller Bearing Co.

Steel (Special Analysis)
Timken Roller Bearing Co.

Steel Storage Bins
Besser Mfg. Co.

Steels, Drill (See Drill Steel)

Stokers
Babcock & Wilcox Co.
Combustion Engineering Corp.

Strippers
Besser Mfg. Co.

Stucco Materials
Geo. S. Mepham Corp.

Tanks
Combustion Engineering Corp.
Link-Belt Co.

Thickeners
Hardinge Co., Inc.

Tile Machines (Drain)
Besser Mfg. Co.

Tires and Tubes
B. F. Goodrich Co.

Tools (Pneumatic)
Ingersoll-Rand Co.

Track Equipment
Nordberg Mfg. Co.
Taylor-Wharton Iron & Steel Co.

Track Shifters
Nordberg Mfg. Co.

Tractors
Koehring Co.

Tramways (Aerial Wire Rope)
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary)
Broderick & Bascom Rope Co.
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Transmission Belting (See Belting)

Transmission Machinery
Allis-Chalmers Mfg. Co.
Timken Roller Bearing Co.

Trenchers
Barber-Greene Co.

Troughs
Cross Engr. Co.

Truck Bodies (Dump)
Easton Car & Construction Co.

Truck Bodies (Ready Mixed Concrete)
Chain Belt Co.
Jaeger Machine Co.

Trucks (Mixers)
Jaeger Machine Co.

Trucks and Trailers (See Motor Trucks)

Tube Mills (See Mills, Ball, Tube, etc.)

Tube Mill Liners (See Mill Liners)

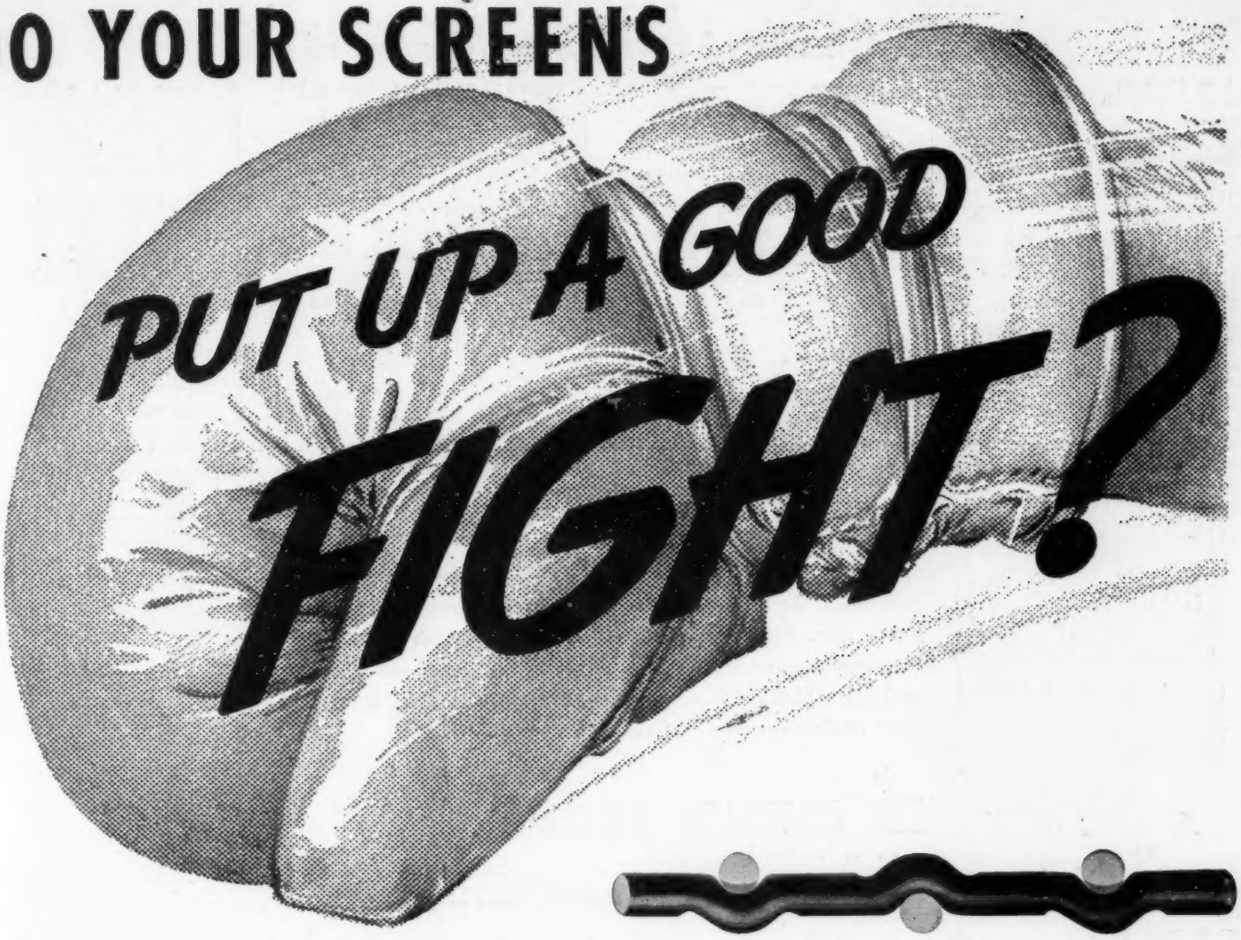
Tubing (Blasting)
B. F. Goodrich Co.

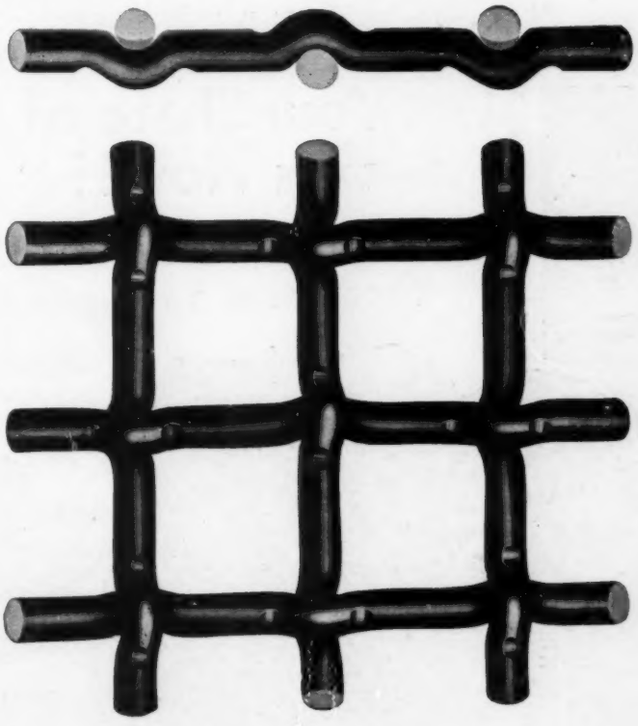
Tubing (Seamless Steel)
Timken Roller Bearing Co.

Underground Shovels
Nordberg Mfg. Co.

Valves (Air)
Cleveland Rock Drill Co.

DO YOUR SCREENS PUT UP A GOOD FIGHT?





It takes wire with plenty of toughness and stamina...with plenty of FIGHT...to stand up under the constant wear and tear of screening operations...and to give long, efficient service in the bargain.

90 years of wire making experience goes into the wire for Roebling Wire Screens. That is why they are able to meet the severest requirements as to strength, vibration and abrasion.

We would welcome an opportunity to cooperate with you in solving your wire screen problems. Roebling Wire Screens are available for sizing, cleaning and grading...in types and metals for all needs.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N. J. *Branches in Principal Cities*

ROEBLING *Wire Screen*

TRADE JERSEY MARK

90 YEARS OF WIRE MAKING SPELLS THE DIFFERENCE

Classified Directory—*Continued*

Valves (Pump)
B. F. Goodrich Co.

Vibrating Screens (See Screens, Vibrating)

Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co.
Austin-Western Road Machy. Co.
Deister Concentrator Co.
Eagle Iron Works
Gruendler Crusher & Pulv. Co.
Link-Belt Co.
Traylor Engr. & Mfg. Co.

Waste Heat Boilers
Combustion Engineering Corp.

Waterproofing
Tamms Silica Co.

Weighing Equipment
Richardson Scale Co.

Weigh-Mix
Koehring Co.

Welding
Allan Mfg. & Welding Co.

Welding Electrodes (Nickel Manganese Steel)
Stulz-Sickles Co.

Welding Rod
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary)
Joseph T. Ryerson & Son, Inc.
Taylor-Wharton Iron & Steel Co.

Welding Wire
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary)
John A. Roebling's Sons Co.

Wire (Flat, Round, Square or Special Shapes)
Wickwire Spencer Steel Co.

Wire (Piano and Music)
Wickwire Spencer Steel Co.

Wire (Rubber Insulated)
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary)

Wire Cloth
Cleveland Wire Cloth & Mfg. Co.
National Wire Cloth Co.
John A. Roebling's Sons Co.
Taylor-Wharton Iron & Steel Co. (Manganese)
W. S. Tyler Co.
Wickwire Spencer Steel Co.

Wire Rope
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary)
Broderick & Bascom Rope Co.
Hazard Wire Rope Co.
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Wickwire Spencer Steel Co.
Williamsport Wire Rope Co.

Wire Rope Fittings
American Steel & Wire Co. (U. S. Steel Corp. Subsidiary)
Broderick & Bascom Rope Co.
Hazard Wire Rope Co.
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Wire Rope Slings (See Slings, Wire Rope)

Wire Rope Sockets (See Sockets, Wire Rope)

THAT'S DEEP HARDENING

This illustration, made from an actual section of a hardened Timken Rock Bit taken from regular production, shows why Timken Bits drill more footage and last longer.

The darker portion of the section extending from the cutting edges downward into the body of the bit indicates the extent of the hardening. Note that it is not only *deep,* but *uniform*—which is equally important.

You can readily see from this illustration why it is possible to regrind Timken Bits several times and still have a fast-cutting, wear-resisting surface equal to a new bit.

Apart from other important Timken features such as the streamlined construction, with shoulder to take the drill blows and protect the threads, Timken deep hardening is sufficient reason for adopting Timken Bits for your work. It will pay you to try them now.

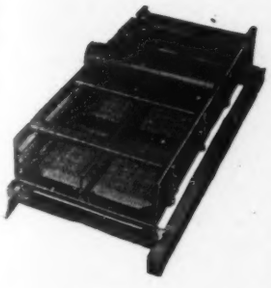
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN BITS

WHAT---!! No Repairs?

"Your machine has been used continuously for the past two years, and without any bill for repairs whatever. We take this opportunity to advise you that we are indeed very much pleased with the service received from this machine."

So writes another satisfied user of the Late Model UNIVERSAL Super - Vibrator. Such service saves money. It is the result of superior design—extreme simplicity—quality materials and unusual ruggedness. Although the UNIVERSAL Super-Vibrator costs less to begin with—it offers the maximum in capacity with low power consumption and absolute accuracy of separation and no annoyance from blinding.



The high percentage of reorders for additional UNIVERSAL Super-Vibrators plus the many letters from enthusiastic users is your assurance of entire satisfaction.

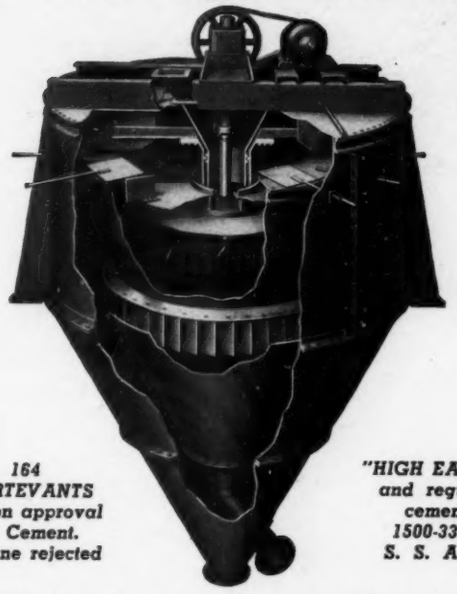
— If Interested, Write —

UNIVERSAL VIBRATING SCREEN CO.

RACINE - - WISCONSIN

STURTEVANT

Air Separators



164 STURTEVANTS sold on approval for Cement. Not one rejected

"HIGH EARLY" and regular cement 1500-3300 S. S. Area

Engineered Installations for raw or clinker show 25 to 100% capacity increase.

STURTEVANT MILL CO. Harrison Square **BOSTON, MASS.**

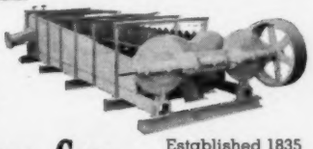
McLANAHAN EQUIPMENT

CRUSHERS

Single and double roll and jaw crushers, hammer mills, super dry pans—steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists.

SCREENS

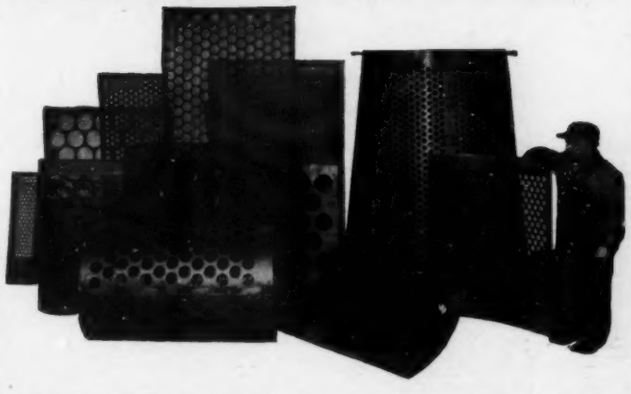
Complete portable, semi-portable and stationary crushing, screening, and washing plants for different capacities of any materials.



McLanahan & Stone Corp.

Established 1835
HOLLIDAYSBURG, PENNSYLVANIA

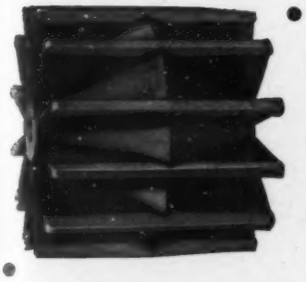
SCREENS of Perforated Metal



For Sand, Gravel, Stone and Ore. Perforations of all standard types, also of unusual sizes and layouts to give large production and reduced screening costs.

The Harrington & King PERFORATING Co.

5650 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N. Y.



CONVEYORS LAST LONGER

where SPROUT-WALDRON Wing Pulleys are used. The same is true of your Elevator belts.

Material conveyed cannot lodge between belt and pulley to cut your belts.

Interchangeable with standard pulleys.

Write for catalog.

SPROUT, WALDRON & CO., INC.

1221 SHERMAN ST., MUNCY, PA.

Elevating, Conveying and Transmission Equipment

CLASSIFIED ADVERTISEMENTS

POSITIONS WANTED — POSITIONS VACANT—two cents a word. Set in six-point type. Minimum $1.00 each insertion, payable in advance.

INFORMATION
Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, 30 inches to the page.

CLASSIFIED — Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

Used Equipment for Sale

CONSOLIDATED GOOD USED EQUIPMENT

2—70"x40' direct heat Rotary Dryers, each with feed, bin feeder, furnace.
2—5x26', 5x30' double shell Ruggles-Coles Dryers.
12—Direct heat Rotary Dryers, 3x30, 4x30, 5x50, 5x60, 6x60.
3—8'x60' Ruggles-Coles single shell Rotary Dryers.
2—P. & M. 8'6" and 9'6"x150' Rotary Kilns.
1—8'x125' P. & M. Rotary Kiln.
2—8'x110' Bonnot Rotary Kilns.
1—6'x60' Bonnot Rotary Kiln, with seals, cooler, hood, etc.
15—Jaw Crushers—No. 1436 Cedar Rapids; No. 1536 Universal; 18x24 Reliance; 24x36 Farrell, Buchanan; 36x42 Traylor, Farrell; 42x60 Farrell; 48x60 Allis-Chalmers; 48x72" Buchanan.
1—7x24" Sturtevant Jaw Crusher, all steel.
1—24"x24" Jeffrey single roll Crusher.
1—18x36" McLanahan-Stone single roll Crusher, Texrope drive, 25 H.P. 3/60/440 motor.
1—36" Superior McCully Gyratory—all other sizes and types.
2—36x16, 20x14" Sturtevant Crushing Rolls; also other sizes, types.
1—24x20" Jeffrey type B Hammer Mill.
1—36"x36" Gruendler Hammer Mill, roller bearings.
2—6x12' Hardinge Iron Lined Rod Mills.
4—Raymond Roller Mills—3 and 5-roll, high side; 5-roll low side.
6—Raymond Pulverizers, No. 0000, 00, 1, 3.
8—Raymond Imp Mills.—No. 3, 45, 50, 55.
6—Hardinge iron lined Ball Mills, 3'x8", 4½'x16", 6'x22"; also other sizes.
1—6'x22" Hardinge silex lined Pebble Mill.
1—10' Sturtevant Air Classifier.
2—Gayco Air Separators, 30", 10'.
6—Tyler Hummer Screens, 3x5, 4x5.
4—3'x6' Sturtevant MV Screens, 2-deck.
1—5'x8' Niagara, 2-deck.
1—No. 32 Marcy Ball Mill.
1—No. 2 Sturtevant Ring Roll Mill, chain drive.
1—57"-54" Fuller Lehigh Pulverizer.
5—6'x22' silex lined Tube Mills.
2—5'x22' silex lined Tube Mills.
1—3'x12' Hendy iron lined Tube Mill.

Just a partial list.

WE WILL BUY A SINGLE MACHINE OR COMPLETE PLANT.
What do you wish to sell? Send us details.
CONSOLIDATED PRODUCTS COMPANY, INC.
15-16-17 Park Row New York, N. Y.
Plant and Shops at Newark, N. J., cover 8 acres of ground.

1—35-ton McMyler Locomotive Crane.
1—30-ton Whitcomb Gas Locomotive.
3—12-ton Whitcomb Gas Locomotives.
1—1-yd. Koehring Gas Crane.
1—¾-yd. Osgood Comb. Shovel-Crane.
1—½-yd. Byers Comb. Shovel-Crane.
5—Clamshell Buckets ½ to 1½.
1245 ft. Ingersoll-Rand Compressor.
450 ft. Ingersoll-Rand Compressor.
1—100 HP. Elec. Dragline Hoist, 2-yd. bkt.
5—Jackhammers.
1—Crane attachment for Marion 32 Shovel.
1—4½x6 Swinging Engine.

J. T. WALSH
Brisbane Building Buffalo, New York

CRUSHER BARGAINS

2' Symons cone fine bowl
2' Symons cone coarse bowl
2' Symons Horizontal Disc
30"x14" DENVER Crushing Rolls

BROWN-BEVIS EQUIPMENT CO.
4900 Santa Fe Ave., Los Angeles, Cal.

FOR SALE

AMERICAN 30-ton 4-wheel saddle tank locomotive, 12x18" cylinders.
VULCAN 33-ton 4-wheel saddle tank locomotive, 13x18" cylinders. (Two duplicates.)
PORTER 36-ton 4-wheel saddle tank locomotives, 14x20" cylinders, (Two duplicates.)
AMERICAN 40-ton 4-wheel saddle tank locomotives, 14x22" cylinders, (Five duplicates.)
BALDWIN 40-ton 4-wheel saddle tank locomotives, 14x22" cylinders, (Four duplicates.)
VULCAN 40-ton 4-wheel saddle tank locomotives, 14x22" cylinders, (Two duplicates.)
AMERICAN 50-ton 4-wheel saddle tank locomotives, 16x24" cylinders, (Three duplicates.)
BALDWIN 55-ton 4-wheel saddle tank locomotive, 18x24" cylinders.
BALDWIN 60-ton 6-wheel saddle tank locomotive, 18x24" cylinders.
AMERICAN 70-ton 6-wheel switching locomotive with separate tender, 20x26" cylinders.
BALDWIN 90-ton 6-wheel switching locomotive with two wheel front truck, separate tender, 23x26" cylinders.

Complete stock list on request.

BIRMINGHAM RAIL & LOCOMOTIVE COMPANY
BIRMINGHAM, ALA.

Jaw Crushers—2"x6" up to 66"x84".
Crushing Rolls—12"x12" up to 54"x24"—Gyratory Crushers—No. 3 up to 42".
Ring Roll Mills — No. 0 and No. 1 — Swing Hammer Mills.
Rotary Fine Crushers—No. 1, No. 1½, No. 2.
Direct Heat Rotary Dryers—4'x30', 5'x50', 5½'x35', 6'x60', 3½'x25', 8'x50'.
Semi-indirect Heat Dryers, 4'x30', 4½'x26', 5'x30' and 8½'x75'.
Cement Kilns—3' up to 9½' diameter.
Hardinge—Marcy & Fuller—Lehigh Mills.
Raymond Mills—No. 00, No. 0, No. 1 & 5 roll.
Tube—Rod and Ball Mills—4' to 8' diameter.
1—6'x22" Hardinge ball mill.
New dryers made for all purposes.
One No. 27 I-R oil furnace for drills.

W. P. HEINEKEN
95 Liberty St., N. Y. Tel.: Barclay 7-7298

FOR SALE

12—5-yd. 36" ga. Western Dump Cars.
6—2-yd. 36" ga. Koppel Steel V Dump Cars.
4—1½-yd. 36" ga. Insley Steel V Dump Cars.
2—3½-ton 36" ga. Whitcomb Gasoline Locomotives.
1—9x10 Sturtevant Vertical Steam Engine.
1—10x10x12 Ingersoll Steam-Driven Air Compressor.
1—9x10 Lidgerwood 3-Drum Steam Hoist.
1—8¼x8 Lidgerwood S.D. Steam Hoist.
22—12-yd. Western std. ga. Air or Hand Dump Cars.
2—40-ton Baldwin S.T. Locomotives, 14x 22 cyls.
Rails—First-Class Relay Rails and Bars, 60, 70, 80, 85, 90 and 100 lb. Rails, Tie Plates, etc.

HYMAN-MICHAELS CO.
20 N. Wacker Dr. Bldg., Chicago
Railway Exchange Bldg. St. Louis, Mo.
101 West 31st St. New York

¾ Yd. P & H No. 206 Crawler Shovel & Dragline Crane.
100, 150, 200, 300, 450, 750 H. P. Diesel Engines.
2 and 3 Drum Hoists. Electric, Steam, Gaso. & Diesel.
50 ton Baldwin Saddle Tank, Built 1926.
No. 5 K Gates and 13" Superior McCully Gyratory.
15" Sand and Gravel Dredging Pump. Any Drive.
1200' and 2000' Air Compressors, Electric & Diesel.

MISSISSIPPI VALLEY EQUIPMENT CO.
515 Locust St. St. Louis, Mo.

LIQUIDATION SALE USED EQUIPMENT

ELECTRIC HOISTS

6—300 H.P. 2 Speed Hoists, 3 Drums.
4—200 H.P. 2 Speed Hoists, 3 Drums.
5—Duplex 2 Drum Loader Hoists, 2—75 H.P.
1—750 H.P. Incline Hoist, Car Mounted.
1—American Duplex 2 Drum Hoist, 80 H.P.
1—American 2 Drum Hoist, 50 H.P. 440 Volt.

TRANSFORMERS

3—250 KVA G.E. 22,000/2,200 V. Single Phase.
3—75 KVA G.E. 22,000/2,200 V. Single Phase.
17—500 KVA G.E. 22,000/600 V. Three Phase.

ELECTRIC LOCOMOTIVES AND TRUCKS

3—6-Ton Baldwin-Westinghouse, Edison Batteries, built 1923-4, 30" Gauge.
1—5-Ton General Electric, Edison Batteries, No. 7869, 30" Gauge.
1—4-Ton Jeffrey, Edison Batteries, 30" Gauge.

INDUSTRIAL CARS

900—Industrial Cars, 18" Flanged Wheels, Roller Bearings.

PENSACOLA COMPANY

Pinedale
Fresno County, Calif.
Phone Fresno 2-1715

1100 Fourth Street
Berkeley, California
Phone BErkeley 9429

18x16 McLanahan Single Roll Crusher.
Smooth Face Crushing Rolls, Rogers, Traylor & Sturtevant 42x24, 36x16, 30x16, 20x14, 16x12.
Rotary Dryers and Coolers, 6x55, 6x50, 4½x30 & 5x44.
Gyratory Crushers, 5K & 6K Gates, No. 5 McCully, No. 6 BH Traylor, No. 49 Kennedy Ball Bearing Gearless with synchronous motor, No. 6 Austin.
Farrell Jaw: 30x13, 30x15, 24x13, 36x6.
Champion Jaw No. 4½ (20x10).
60' Guy Derrick Handling Outfit with 60 HP Gas Hoist.
1 yd. Sauerman Elec. Slackline Outfit.
1¼ yd. Marion Electric Cat. Shovel AC.
¾ yd. Marion Electric Cat. Shovel AC.
Tube Mills: 7x22, 7x10, 5½x20, 5x22 & 5x18.
¾ yd. Northwest Gas Cat. Shovel.
Pennsylvania S-7 Hammer Mill.
200' 16" Conveyor Belt.

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(Classified Advertising Continued on Next Page)

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1—20" AMSCO. Dredging Pump, 1000 H.P., 2300 v. motor.
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3—500 cu. ft. Chicago Pneu. Air Comp.
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6—4", 6", 8" Centrifugal Pumps.
24"x400' Belt Conveyor, 16"x100', 22"x600'.
½ yd., ¾ yd., 1 yd. and 2 yd. Clamshells.
2—2 yd. Meade-Morrison Clamshell Buckets.
3—Hayward ¾ and 1-yd. Orange Peels.
6—12 and 14-ton 36" ga. Gas Locomotives.
1—43-ton Baldwin Switching Locomotive.
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15—2-yd. V-shape Standard Ga. Dump Cars.
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14 cars like new, Easton 36" ga., 2 cu. yd. capacity, "V" shaped, all steel, heavy duty. Also, all sections new and relaying rail and portable track, 12 lb. to 130 lb. Wire or write for prices.

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437½ KVA Allis Chalmers generator, 3 phase, 60 cycle, 2300/600/480/240 volts, 200 RPM, direct connected to 520 HP Busch Sulzer full diesel oil engine. Good condition.

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1—8 ton Standard Gauge Gasoline Locomotive.
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1—4" Self-priming Barnes centrifugal pump —Hercules engine—4 months old.

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In Excellent Condition

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2—15 ton Plymouth 36" gauge gasoline locomotives.
Completely rebuilt—Like New.

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Belt Elevator—24" Buckets & 60' High.
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Chain Elevator- -12" Buckets 32' Enclosed.
Repair Parts—For Bucket Elevators.
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Schramm Electric Air Compressor, 120'.
Single Drum Hoist, 15 HP, Double Reduction.
Hummer Double Deck 3x5' Vibrating Screen.
Link-Belt Double Deck 3x5' Vibrating Screen.
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Belt Conveyor—16" Wide & 35' Long.
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Goulds Centrif. Electric Pump, 1000-gal., 6" dis.
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Locomotive Boilers 125 lb. ASME, 50 & 100 HP.
2—Easton 1-Yd. Swivel Cars, Brakes, 24", New.
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This includes clamshell bucket.

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676' Worthington Duplex Air Compressor.
2040 & 3600' I. R. Elec. Compressors.
30" by 10' Feeder & Mag. Pulley.
Jaw Crushers: 9x16, 15x30, 24x36, 42x40, 10x30 & 5x12.
2 Fuller Kinyon 8" Type B Cement Pumps.
25 Ton & 40 Ton Steam Locomotives.
8 and 14 Ton Plymouth Gas Locomotives.
24", 30", 36" Conveyor Equipment.
18"x30' Steel Pan Conveyor.
8 Hummer, 4 Niagara Vib. Screens.
5 yd. Monighan Diesel Dragline.
4½x6 Mundy Steam Derrick Swinger.
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Buchanan 30" Magnetic Pulley.
90 HP Fairbanks Morse Diesel Engine.
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36x16 Kennedy Double Roll Crusher.
7x10 Double and 3 Drum Steam Hoists.
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25 Ton Ohio Locomotive Crane.
85 Kw, 250 V-DC, 220 V-AC M.G. Set.
110 HP Single Drum Incline Hoist.
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1-15 ton WESTINGHOUSE BATTERY TYPE SWITCHING LOCOMOTIVE, Standard Gauge. Also JEFFREY, GENERAL ELECTRIC, WESTINGHOUSE, and GOODMAN, Electric Locomotives for every purpose, all weights and gauges.

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Monighan 3W Diesel Drag.; Northwest No. 7 comb. Diesel-Electric Dragline, 3½-4 yd., 100-115' boom.
Link-Belt 1 yd. Shovel, Crane, & Dragline.
Erie stm. cat. shovel. Cats. & front for Thew.
Orton ¾ yd. Crane, 35-50' boom. Very low price.
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Sauerman 1 yd. Drag Scraper hoist. Others ⅜-5 yds.
Bucket Loaders—Haiss, Barber-Greene, & Link-Belt.
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One No. 4 or No. 5 Raymond Roll Mill. State location, age and condition.

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LEE, MASS.

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Portable and stationary, belt, with elec. or gas power, sizes from 21 cu. ft. to 1,000 cu. ft.

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1—4-yd. Hayward Class "G" clamshell.
34—Williams, Blaw Knox, Owen clamshell buckets, all sizes and types.
5—Dragline buckets, 1—Northwest 1¾-yd., 2—Page 1½-yd., 1—Page RC 1¼-yd., 1—Blaw Knox 1-yd.

CABLEWAY EXCAVATOR AND DRAGSCRAPER OUTFITS

6—Dragscraper buckets from ½ cu. yd. to 2 cu. yd. size.
1—Thos. 150 HP DD special cableway excavator hoist No. 7671, Class L, for handling 2 yd. bucket.
1—O. K. Clutch & Machinery Co. 120 HP. 3 drum gasoline dragscraper hoist for handling 2 yd. bucket.
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Large lot including std. ga. 6 and 12-yd. and 20-yd., 36-ga. 5 yd. and 24-ga. 1½-yd.
16—2 yd. 36 inch ga. Continental 2-way wood body dump cars.
4—30-yd. Clark Standard gauge air dump cars, drop door type.

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9—Port. belt conveyors with steel frame, gas, or elec. pr. 18 and 24 in. Barber-Greene and Chic. Automatic.
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5—Locomotive cranes; sta. ga. 30 and 25 tons; Ohio, Browning, American, Industrial.

CRANES AND DRAGLINES

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1—Northwest Model 104, Serial No. 2079, 45′ boom, 1¼-yd. bucket.
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1—Link Belt Model K-1 crane, shop No. 1024, 50′ boom, 1-yd. bucket.
1—Osgood heavy duty dragline, Serial No. 2069.
1—Industrial Brownhoist type CC, No. 5071, 30′ boom, ⅜-yd. bucket.
1—Byers Bearcat crane, Model 26, Ser. 30474, half circle swing, ½-yd. bucket.
1—Erie type B-2, Serial No. 3900 steam crane, 40′ boom, 1-yd. bucket.

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1—Symons coarse cone crusher, size No. 5½, SU No. 521.
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1—Allis-Chalmers, Style N, No. 6, gyratory No. 7755.
1—Allis-Chalmers Gates No. 5, Ser. 5331.
2—McCulley No. 3 gyratory.
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Steel and wood, stiff leg, or guy; from 2 to 50 tons, including 2 steel stiff legs.

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32—Gasoline locomotives, from 20-ton to 2-ton, std. ga. 36″ and 24″ ga. including 1—12-ton Plymouth std. ga. gasoline locomotive Model JLB, Ser. No. 2308.
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4—Belt Driven Dredge pumps. 1—8″ Morris; 1—6″ Morris manganese; 1—6″ Erie; 1—4″ Morris.

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1—Lorraine 75-D 1¼-yd. shovel No. 4653 and with pull shovel attachment.
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3—Link Belt shovel attachments for K-55, K-44, K-42, K-38, K-2 machines.

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Used Small Duntile Brick Machine
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PARTNER WANTED

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POSITION WANTED AS SUPERINTENDENT with a progressive stone company. 20 years' experience operating limestone quarries and crushing plants; familiar with all modern equipment; efficient handling of labor with record of low cost of production; qualified to assume full charge of any size plant or plants; unquestionable reference. Open for engagement. Address Box 746, care Rock Products, 205 W. Wacker Dr., Chicago, Ill.

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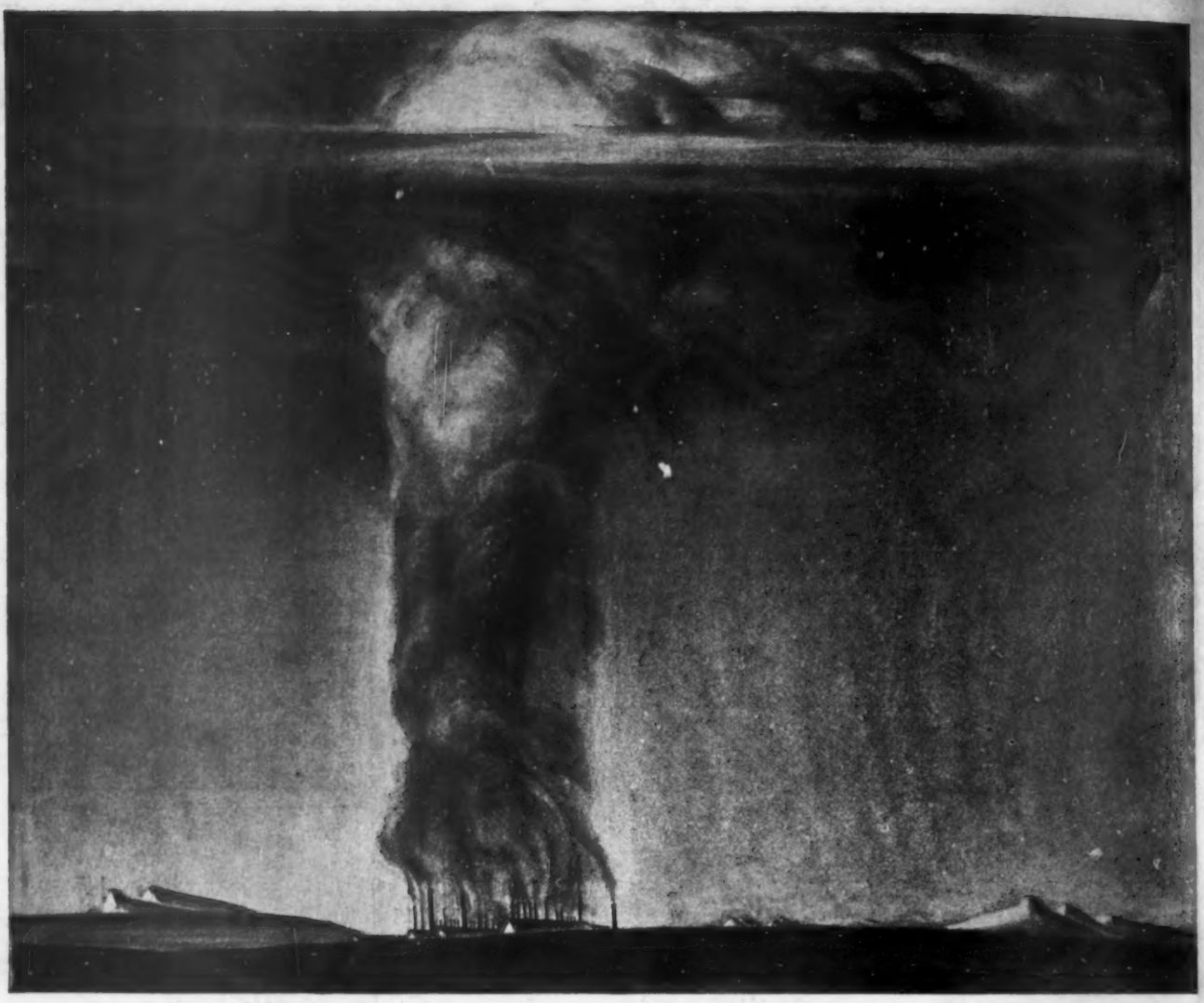

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